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CONTENTS

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Signs for Language Origins?

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Abstract

Taking the recent publication of *The Gestural Origin of Language* by David Armstrong and Sherman Wilcox as a starting point, this essay discusses a number of issues and difficulties raised by the idea that language first emerged as a gesture-language, only later to become spoken. It is argued that while modern sign languages may throw light on processes that are fundamental to language formation, they cannot be considered representations of an earlier form of language, as some writers seem to suppose, nor does their existence offer any support for a 'gesture first' theory. Rather, language must have been, from its first appearance, a multimodal phenomenon. It is pointed out that modern speakers, *qua* speakers speaking spontaneously, always employ several modalities together in a complex orchestration. However, the model of language generally followed in linguistics, whether the language studied is spoken or signed, does not usually take this into consideration. An abstracted idea of language is usually employed, developed largely because the systematic study of language usually considers language only in its written form, and not as it is manifested when spoken, when it is an activity that involves the whole body, and not just the so-called 'speech apparatus'.

1 Introduction

In *The Gestural Origin of Language* (2007) David Armstrong and Sherman Wilcox argue that by examining the processes by which "visual varieties of language, especially signed languages of the deaf but also writing" come into being "we can learn much about the way language in general probably emerges" (p. 7). In this, as the authors acknowledge, they follow a position previously put forward by E. B. Tylor (among others) who, in his *Researches into the Early History of Mankind* (1865) wrote that through the study of gesture language and picture writing it would be possible to "realise to ourselves in some measure a condition of the human mind which underlies anything which has yet been traced in even the lowest dialect of Language if taken as a whole (p. 15)." That is to say, the study of gesture and picture writing can reveal to us something of the fundamental process by which language is created, which cannot be achieved if we consider only spoken language. This is because, if we examine the history of spoken languages, we can only see how contemporary words derive from other words. If we examine the history of the development of writing and also changes with time of signs in signed languages, on the other hand, we can see how contemporary forms appear to be derivable from earlier forms that do not have the highly coded forms characteristic of the units of language. Thus, in the history of the Sumerian script, for example (which Armstrong and Wilcox refer to in the penultimate chapter of their book), it is possible to observe a progression from earlier pictorial forms to later forms that are highly conventionalised and seemingly arbitrary in form.

Likewise, in sign languages, as has been described by a number of authors (Tervoort 1961, Frishberg 1975, Bellugi and Klima 1976, among others), when signers introduce a new item into their lexicon they often do this by first referring to the new item by means of a depictive gesture or pantomime. Subsequently, such a form may become simplified and stabilised in form, it takes on characteristics which are shared by other items already in the sign lexicon, establishing itself as a highly 'reduced', conventionalised, even seemingly arbitrary form, which can become shared as a vocabulary item in the community of signers within which it arose. By looking at the *emergence* of signed languages, thus, we seem to be able to witness the process by which something that at first is not 'linguistic' becomes so.

To be able to do this, of course, requires that we have an idea of what is 'not linguistic' and what is 'linguistic', so that we can understand the trajectory of transformation being examined. The present authors leave this to the reader. They take it for granted that it will be understood what it is that is supposed to have emerged for they nowhere offer an explicit definition of 'language'. From the way the authors discuss things, however, we may gather that they tend to use the word 'language' in two main senses: a *functional* sense and a *formal* sense. From the point of view of a *functional* sense, any sort of action that makes possible discursive reference to concepts or ideas would be counted as 'language'. For example if, by my idiosyncratic pantomiming and vocal growling, I am able to make you understand that there was a panther near the camp last night, this would be an instance of 'language' considered from a functional point of view. How 'language', in this sense, came into being is one kind of language origins question. From the point of view of a *formal* sense of the word 'language', on the other hand, this discourse about last night's panther visit would not be regarded as 'language' unless the units of action I had used to convey my meaning were highly conventionalised, were arbitrary in respect to how their forms relate to their meanings, and can be analysed into interchangeable components which function only to maintain contrasts between the forms being used. Further, it would be important to show that the way in which these meaning-bearing units are organised in relation to one another can be accounted for in terms of certain more general syntactic rules. How 'language', in this sense, came into being, is another kind of language origins question. Since the authors do not keep separate these different senses of the word 'language' it is not always clear which language origin question they are discussing. So when they refer to the evolutionary development of our abilities to conceptualise objects and interactive processes between objects as leading to the emergence of language (see pp. 90-91), we don't know whether they want us to think that what is emerging here is 'language' in the functional sense distinguished above, or 'language' in the formal sense.

The present authors previously collaborated with the late William Stokoe and, together with him, they had laid out their main argument in a book published in 1995 (Armstrong, Stokoe and Wilcox 1995), Stokoe himself published a book on his own in 2001 which argued along similar lines (Stokoe 2001), while Armstrong published his own separate discussion in 1999 (Armstrong 1999). As in these other publications, so here, the central claim is that it must have been in the medium of visible action that linguistic expression first made its appearance.

A possible corollary to this claim is that 'sign language' was, in consequence, the first form of language. Some authors have, in fact, made this claim. For example, Corballis (2002: 125) writes that his "guess is that the precursors of *H. sapiens* had in fact evolved a form of signed language similar in principle, if not in detail, to the signed languages that are used today by the deaf." A similar view was expressed by Hewes (1973). The present authors are perhaps not quite so strongly committed to this idea. On p. 17 they say they start from the premise "that signed languages are the original and prototypical languages", but elsewhere in the book they do not exclude the idea that evolutionarily early forms of language also had a vocal component. Thus, on p. 68 they write "there never was a time when visible gestures were unaccompanied by vocalizations." As will be discussed further below, the issue of when and how spoken language evolved and what its relationship may be to signed language, whether evolutionarily early or modern, remain points of considerable difficulty.

2 Origins of the 'gesture first' theory

The idea that human language (at least in the functional sense of this term) can be accomplished by means of visible bodily actions, or 'gestures', as well as by means of vocalisations, is by no means new, of course. Armstrong and Wilcox quote a passage from Plato's *Cratylus* which makes it clear that the idea that one could accomplish what may be expressed in a spoken language with gestures instead of speech was well known in Classical Antiquity (gesturing deaf-mutes were known in Ancient Greece). It was often supposed, however, that not only could gestural expression serve the same functions as spoken language. It was also seen as more natural, perhaps because it was seen as something that all humans had in common. In this it contrasted with spoken languages, which because they differ radically from one another, seem more like artificial inventions. As Quintillian remarks, writing in the First Century CE, "...though the peoples and nations of the earth speak a multitude of tongues, they share in common the universal language of the hands" (Quintilian 1922: 291). Spoken languages differ widely and promote divisions among humans. By contrast, the language of gesture seems to unite them.

This idea of gesture as a universal and unifying form of expression finds formulation not long after the beginning of the modern era. The first books ever to have been published that were devoted wholly to the topic of gesture were Bonifaccio's *Arte de' Cenni* (Art of Signs) of 1616 and John Bulwer's treatises *Chirologia ... and Chironomia...* that were published together in a single volume in 1644 (Bulwer 1974). Both authors proposed that gesture was more natural as a form of expression than spoken language. Bonifaccio wondered if the state of human society would be improved if we all returned to this form of expression, originally given to us by God, because it could be understood by everyone, and Bulwer, likewise, wondered if gesture was a form of language that "had the happiness to escape the curse at the confusion of Babel" (Bulwer 1974:19)

In the eighteenth century the possible natural (as opposed to Divine) origins of language began to be widely discussed. Given the idea that gestural expression was both natural to humans and universal in its form, it is not surprising

that the idea came to be widely entertained that language began with visible actions, not with vocal utterances. An early explicit expression of this idea, as is mentioned by Armstrong and Wilcox, is to be found in a treatise by William Warburton, Bishop of Gloucester, who had published, between 1738 and 1741, a large book on Egyptian hieroglyphics. He argued that these hieroglyphics were not invented by priests as an obscure form of expression as a means to preserve their power. Rather, they had evolved as abbreviations of an earlier form of picture writing. Writing, according to Warburton, began as a form of pictorial representation, and then, as the ideas to be expressed became more numerous, these representations underwent a process of progressive reduction, until they no longer had any representational features. Only then would they be completely obscure to those who had not studied them. Warburton believed that this process reflected a general process in terms of which the origins of all languages could be explained. In the beginning, he said, humans expressed themselves by pantomimic gestures, by significant actions and expressive sounds. Evidence for this could be found in the accounts of the deeds of the Prophets of the Old Testament, who often were described as engaging in dramatic actions to convey what they had to say. In the course of time, however, these expressions became shortened and transformed into figurative speech and then into the highly abstract expressions derived through reason that characterises modern languages (Rosenfeld 2001: 38-39). These ideas were taken up by Etienne Bonnot de Condillac who, in his treatise on the origins of human knowledge published in 1746, quoted extensively from Warburton's work. He proposed a scenario in which the first interchanges of a linguistic kind would have been carried out through actions rather than through vocal utterances, that expressions would have been combinations of pantomime and vocal expression and only later did the voice become more and more refined until it was capable of the sophistication and complexity of expression of modern times.

At the same time as Condillac was developing these ideas in Paris, and unknown to him, Giambattista Vico, in Naples was writing his *Scienza Nuova* (the third, final edition of which was published in 1744, the year of his death). In this book he, too, proposed that language began with visible actions. Vico, however, gave emphasis to the idea that language begins as a "mental language" which developed from "poetic logic" in which humans perceived things and events *metaphorically*. He writes "the first poets attributed to physical bodies the being of animate substances" [404] and he draws attention to the fact that "in all languages most expressions for inanimate objects employ metaphors derived from the human body and its parts, or from human senses and emotions" [405]. Thus a potato is said to have 'eyes', a fork is said to have 'teeth', a peach is said to be composed of 'flesh' outside with a 'bone' inside (and, indeed, it has a 'skin' too). For Vico, this kind of metaphorical perception is fundamental to the establishment of the conceptual categories which a language expresses, which at first is done by way of "signs,

actions or physical objects which had a natural relation to the ideas expressed [401]."[1] Language (functionally understood) could have had its origin in this.

This capacity for metaphorical perception, of being able to see abstract resemblances between otherwise unrelated events or objects, a capacity also stressed by Heinz Werner in his account of symbol formation (Werner and Kaplan 1963), is fundamental to the scenario that Armstrong and Wilcox propose by which language first became established. For they suppose that what came about was a capacity to see that movements of the hands could directly represent objects and events in the environment. This idea was put forward in a particularly clear manner by William Stokoe (1991) in a paper much quoted by the present authors. In a critique of what were, in his opinion, misguided attempts to analyse signs in a sign language in terms of models borrowed from phonological analyses of spoken languages, Stokoe pointed out that a sign is also an *action*. For example, moving the right hand partially open over to the left hand, posed so that the index finger is held vertical and, in the moment of the approach of the right hand its fingers close round the left hand's index finger, to sign CATCH or GRASP, is an action in which the right hand grasps the upraised finger of the left hand. And as an action it already has meaning: the acting hand acts on or in relation to another body part. Further, Stokoe argued, the entire configuration of action contains within itself the structure of an event which could be seen as having a sentential representation: the moving hand is at once an agent and an action. In the sign for CATCH or GRASP the finger the right hand grasps is the 'object' of this 'action'. Within the unit of action which is the 'sign', thus, there is already a structure of agents and objects and actions joining them in some relation. The crucial step, it seems, was the development of an ability to see "hand-shapes representing subjects, their movements representing predication, and the whole gesture a complete thought..." (Stokoe 2001: 82). Or, as Armstrong and Wilcox write: "Visual articulators such as hands and faces come with inherent conceptual significance" (p. 109) adding (on another page): "Visible gestures are at once actions in the world, actions with instrumental function (grasping prey) and, at least potentially, communicative actions, acts that convey information, intent and relationship ("I grasped the prey"). It is not merely that visible gestures can be iconic for objects and events in the world - visible gestures *are* objects and events in the world." (p. 64).[2]

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[1] See the section 'Poetic Logic' in Giambattista Vico *New Science* (1999, trans. David Marsh. See also Bergin and Fisch 1984). The numbers in square brackets refer to paragraph numbers in Vico's text. For one attempt to systematise Vico's views on language origins and to align these with modern studies see Danesi (1993).

[2] In this they appear to have been anticipated by van Ginneken (1939), at least as his views are described by Todorov (1982). Todorov (p. 234) states that according to van Ginneken the gesture [as a linguistic action] is primordial because "it is part of the action it designates ... the [gesture] sign signifies itself." He quotes van Ginneken (1939:127): "The gesture in this case is nothing but the work begun in the outdoor air, and that the manual concept brings to life again inside. Thus it is natural language. For here there is no convention. The sign is the natural sign, for it is the signified itself." See also the fascinating article by Frank Cushing (1892) who claims that the actions of the hands are intimately involved in the emergence of language, not just of words but of syntax also: "...the very earliest uttered speech was already framed complexly by the two hands - one acted upon, the other acting upon it." He seeks to demonstrate this with an analysis of Zuni verbs.

On this view, then, the first development to take place in the direction of being able to use actions as a means to communicate something *about* objects and events in the world (rather than as a way of indicating a likelihood of acting in a certain way) - development of 'language' in the functional sense distinguished above - required the ability to see visible actions, motions of the hands, let us say, as being *like* the motions and interactions of objects in the environment. Engaging in forms of action that are seen as *like* forms of action that can be observed in the environment provides the very first step in the emergence of language. An understanding of how this kind of perception began phylogenetically is crucial for an understanding of how language (in the functional sense) started. As far as I know, not much is known about this (but see Hurford 2007 for a suggestive review).

However, an ability to see visible actions in terms of their likeness to motions and interactions of objects in the environment would not, in itself, be sufficient to start a language. As Burling (2005) has pointed out, just as important is an ability to *represent* such perceptions *for others*. He writes (p. 20) "If no one else was around with the skills to understand, what could the first speaker hope to accomplish with her first words? The puzzle dissolves as soon as we recognize that communication does not begin when someone makes a meaningful vocalization or gesture, but when someone interprets another's behavior as meaningful." Bickerton (1981:264) raises the question of how the actions of another come to be recognised as meaningful: "When A, the first hominid ever to use a sound sequence or a gesture referentially made such a sequence or gesture to B, another hominid, how did B know that A was communicating referentially and not merely coughing, clearing his throat, scratching himself , or brushing a fly away?" (see also Kendon 1991).

In reference to this it has lately become common to refer to the discoveries of mirror neurons which suggest that when an action is observed, neurons in the observer become active that would be used were the observer to carry out that action. This seems to provide a physiological basis for empathy, and has provoked much discussion (Rizzolatti and Arbib 1998, Stamenov and Gallese 2002, Bråten 2007) although, as Damasio and Kaspar (2008) have pointed out, rather little is actually understood about how they actually play a role in the processes of action recognition in others.

3 Conceptions of language

Starting a discussion about the origin of language in this manner means that the conception one has of 'language' and of the processes by which it came into being is one that sees it as something that has emerged through processes that, in principle, are not special to it but are involved in many other kinds of cognitive and expressive functions. This is very different from the conception of language that has been dominant in many current discussions of this topic.

Armstrong and Wilcox identify as "Cartesian" the view that what is distinctive about language is its syntactic component, understood as a set of formal algorithms that generate strings of elements in sequences that conform to grammatical rules. It is of central importance to these rules that the sequences of grammat-

ical strings can have the property of recursion (embedding phrases within phrases) for it is this that makes possible the infinity of expressions that has been identified as the distinguishing character of language, from this point of view. This so-called "Cartesian" view nowadays, of course, is largely identified with the work of Noam Chomsky, which may be said to be its epitome. As is very well known, Chomsky has long maintained that this feature is found nowhere else in the animal kingdom, that it is unique to humans. In consequence he has held out little hope that any light could be thrown on the origin of language through the comparative study of the communication systems of other animals. Hence, for him, the possibility of an explanation of language origins in terms of evolutionary theory seems quite remote. He suggested that humans came to possess this defining feature of language as a result of the intervention of a mutation that brought about a reorganisation of the brain, an idea that has found favour with only a few scholars, since it is not in good accord with modern concepts of the process of biological evolution. Lately, Chomsky has modified his position somewhat. In a recent paper, together with two colleagues who are experts in animal communication, Chomsky has suggested that comparative studies of the cognitive capacities of other animals might throw light on the origin of this syntactic capacity (Hauser, Chomsky and Fitch 2002). However, it is suggested that this capacity might not have developed in relation to language at all, but might be the consequence of some other cognitive capacities (capacities connected to orientation within and exploration of the environment, for example) which came to be "exapted" for language at a certain stage in human evolution. How they came to be so, if indeed this happened, is left unaccounted for.

Armstrong and Wilcox's approach is quite different.[3] In their view, language is seen as growing "out of the human body interacting with its physical and social environments - metaphorical structures are the pathways from gesture to meaning." (101). Language is an emergent consequence of certain perceptual, cognitive and social interactive processes, that is to say, and it does not require the postulation of specialised modules in the mind (or brain) that are autonomous, separate from cognitive processes that operate in other realms, wholly novel and unique to the human species, or derived from something that has nothing to do with communication. As noted above, following Stokoe, they argue that even the elaborate syntaxes of modern spoken languages can be seen to have their roots in a process by which a syntactic structure can be unpacked from unitary representations of events. In arguing for this view, they make use of the framework of cognitive linguistics, especially as this has been developed by Ronald Langacker (e.g. 1991) and they also draw from the work of Talmy Givon (1995) and John Haiman (1985, 1998), who have argued for the 'iconicity' of syntax and who have sought to show that the construction of sentences often follows patterns which map the patterns of the event sequences that the sentences are about.

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[3] At least so it seems. Since Hauser, Chomsky and Fitch (2002) this is less clear, for according to these authors, as just mentioned, the cognitive capacity that makes recursive syntax possible could derive from a general capacity that has to do with the organism interacting with its physical environment, although not one developed in relation to communication, necessarily. For Armstrong and Wilcox (p.55) this paper is "a positive step by Chomsky" although they are anxious to show that the cognitive capacities leading to recursion in language "does involve communication" and they believe they can show this by means of Stokoe's notion of 'semantic phonology'.

This framework is not, of course, the framework that has been the main guide in the development of linguistics, at least not in North America, during the central fifty years of the twentieth century. According to this framework it is maintained as a cardinal principal that linguistic *form* is to be studied separately from *meaning.* This is a consequence of the doctrine of the arbitrariness of the linguistic sign which came to be firmly established as an axiom of modern linguistics at the beginning of the twentieth century, largely as a result of the influence of Saussure's *Cours,* a doctrine still widely adhered to today (for one - out of many - useful discussions of this see Waugh 2000). The belief in the arbitrariness of the relation between a linguistic sign and its meaning led to the attempt to develop the analysis of language as a system of relationships between forms, without taking meaning into consideration. Accordingly, there is the study of the sounds of speech, or *phonology,* in which the function of speech sounds is studied from the point of view of how they serve to keep meaning-bearing units apart; of *morphology* in which the principles according to which meaning-bearing units are constructed out of the speech-sound units that are distinguished in phonology are sought out; and *syntax,* in which the principles governing the way morphological units are organised together into sentences are analysed. Meaning is to be studied separately as *semantics.* In the strict structuralist paradigm, the main concern is with how units of meaning, however these are to be defined, are themselves patterned in relation to the language's morphology and grammar. The issue of *how* forms and meanings are related has largely been avoided.

This approach to the analysis of language was especially dominant at the time William Stokoe undertook his pioneering analyses of American Sign Language (he acquired his knowledge of linguistics under the guidance of George Trager and Henry Lee Smith at the University of Buffalo, who were among the most prominent exponents of this 'structural' approach to language - see Stokoe 1960: 3) and his analysis of sign language structure represented an attempt to establish that something analogous to phonology and morphology could be shown to be present in the sign language he studied. Subsequent developments in sign language linguistics have, until recently, largely followed this model, even though those features of signed language that derive from the fact that it is a language constructed of visible bodily actions that can exploit space as a medium for significant linguistic contrast cannot easily be accommodated.

The motivation for doing this is to be understood, at least in part, against the background of a prejudice against sign language that had long been prevalent. As Armstrong and Wilcox describe it, this stems from the development of a movement that led to the rejection of sign language as a 'language' in the formal sense. Although, from the time of Abbé de l'Epée in Paris in the 18th Century, who was among the first to explicitly recognise the linguistic value of the visual communication systems used by the deaf, there were many who promoted sign language as a medium of education for the deaf, there were many others who were opposed to this. The advocates of an oral approach to deaf education argued that signing was mere pantomime, it was capable only of concrete expression, and it would be incapable of serving as a vehicle for abstract thought and reasoning. To use it as a medium for the education of the deaf would forever condemn them to a second class social and mental life. This view gained wide official sanction after

the Congress of Educators of the Deaf held in Milan in 1880, where a resolution that stated that the use of sign was to be banned in all instructional contexts and only methods which sought to teach the deaf to use spoken languages were to be followed (Facchini 1983). This had far reaching effects and led to the complete marginalisation of signing in schools for the deaf (Baynton 1996, 2002) and it also contributed to the great decline in interest in gesture languages of any sort, indeed in 'gesture' in general, that followed soon after this (see Kendon 2004: 62-83; Kendon 2007).

This dismissal of sign language and the corresponding lack of interest in it, persisted well into the twentieth century. Consequently William Stokoe's work was at first met with considerable opposition among the educators of the deaf and with scepticism in the academic community.[4] However, Stokoe's own tenacity in promoting his view, which received important support from certain prominent linguistic scholars,[5] eventually wore down this scepticism to the point that, within a few years of his first publication a number of linguistically trained students took up the serious study of signed language from a linguistic point of view. In the development of signed language linguistics that followed, carried out at first by a relatively small group of investigators, a great deal of what was done was motivated by a desire to show that signed languages were "just like" spoken languages in every important respect. If this could be shown, it would make them fully worthy as a medium for the expression of abstract thought and completely appropriate as a medium of education. There was the fear that if it was admitted that something like 'gesture' operated in signed language, the campaign to legitimise signed language as being fully the equivalent of spoken language would be undermined. This meant that the rather obvious and pervasive iconicity that is to be found in signed lexicons, phenomena such as the use of space to establish grammatical relations within sentences, the use of so-called 'classifiers', and other phenomena that seem to be suspiciously similar to the 'gesturing' observed among non-signers, have either been played down in importance or have been explained away with attempts to show that they serve abstract grammatical functions that are like those found in spoken language grammars and thus have nothing to do with 'gesture'. As Wilcox has put it in another publication, in this approach it is necessary to "bleach language of all its bodily substance until we arrive at the ultimate abstraction: disembodied language, pure structural relations" (Wilcox 2004:151).

Armstrong and Wilcox, on the contrary wish to show that the linguistic characteristics of signed languages, the features that qualify them to be referred to as

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[4] See the review of Stokoe (1960) by Herbert Landar in *Language* in 1961 who concludes his review by wondering how many linguists will share Stokoe's conviction that "the communicative activity of persons using this language is truly linguistic", given that "a signalling system which does not involve a vocal-auditory channel directly connecting addresser and addressee lacks a crucial design feature of language". (Lander 1961: 271).

[5] Notably William Austin at Georgetown University as well as Trager and Smith, who had promoted Stokoe's first publication. Stokoe addressed the Georgetown Roundtable in Linguistics in 1966. Thomas A. Sebeok also played an important role. He it was that obtained the necessary support for starting up the journal *Sign Language Studies*, first published by Mouton of the Hague with the support of the Indiana University Research Center for the Language Sciences, of which Sebeok was the director.

'language' in what I referred to above as the *formal* sense, are emergent properties of processes that serve to transform expressive actions that do not have these characteristics (often referred to as 'gestures') into forms that do. In the context of contemporary sign language linguistics this can still appear somewhat radical, however a point of view compatible with that being developed in this book by Armstrong and Wilcox is now becoming more widespread, as may be seen in the work of Bouvet (1997), Cuxac (see Cuxac and Sallandre 2007), Taub (2001), Liddell (2003), Russo (2004), among others.

These considerations make plausible the idea that a language can be created out of modes of action that re-present in pantomimic, depictive and diagrammatic form, event descriptions and references to objects and ideas, and that we can see how such modes of action might come to be used as a way of communicating to others memories, perceptions and thoughts. Through processes of this sort we can imagine how a shared conventional system might come into being, that would have all the marks of a 'language' in the 'formal' sense.

4 The relevance of palaeontology, neurophysiology and ontogenesis

However, to support the view that these processes of language emergence are also the historical processes by which present day languages came into being, other kinds of considerations must be brought to bear. Since we cannot travel back in time to see what humans or their predecessors were like before they had language, we have to depend upon various kinds of information that can make a backwards reconstruction possible. Today, for this kind of backwards reconstruction, it is common to rely upon findings from the comparative study of the behaviour of living primates, recent work in the neurophysiology of speech, vocalisation, perception and action in both humans and in other primates, observations on how language is acquired in the course of growing up, and the palaeontology of the hominidae.

Armstrong and Wilcox summarize some of these findings in Chapter 2 of their book. Thus, it has been argued that human spoken language cannot easily be derived from the systems of vocalisations in our primate relatives, such as chimpanzees and bonobos, insofar as the neural systems by which these are controlled are quite different from those found in humans, who have full voluntary control over their vocalisations, whereas apes and monkeys do not (Ploog 2002 provides a recent summary). As the 'ape language' experiments of the Gardners, Premak and the Rumbaughs have shown, apes such as chimpanzees and bonobos can master symbolic expression to some degree, and, as the Gardners showed, they can be taught to express themselves symbolically through visible manual actions, but they cannot be taught to speak. [6] Work on the neurophysiology of human speech perception and production and the perception and production of manu-

[6] It was this discovery that played an important role in prompting Hewes' first formulations of modern versions of the 'gestural origins' theory (Hewes 1973). It also played a not unimportant role in providing a 'push' for the development of a modern linguistics of signed language (see Kendon 2002a).

al actions, including the manual actions of signing, suggests that the centres in the brain controlling these processes overlap anatomically and are functionally co-involved (see Kimura 1993). Much prominence has been given to the discoveries of Rizzolati and his colleagues of so-called 'mirror neurons' which suggest a neurophysiological basis for the process by which monkeys and people understand each other's actions. It has been claimed by Rizzolati and Arbib (1998) that the area of the cortex of the rhesus monkey where mirror neurons were first observed is homologous to the area of the human cortex known as Broca's area, which is known to be much involved in spoken language production. Armstrong and Wilcox note that, if substantiated, this "would suggest specifically that the brain region in humans that provides the sine qua non for speech may have started out subserving instrumental manual activities that became gestural and communicative." (p. 26). Studies in the emergence of language in the course of human development (which Armstrong and Wilcox refer to but briefly, however) show that the first forms of action that have a referential function to be observed are gestural and that, at a certain stage, infants may use a mixed media vocabulary, some items being gestural, others being vocal, although beyond the age of two years hearing children shift definitively in the direction of a spoken vocabulary (Capirci, et al. 2002 provides an overview). As for the palaeontological evidence, it is known that bipedalism in the line leading to humans emerged very early and that this was associated with a development of the anatomy of the hand which led it to become much like a modern hand, well before the changes in the upper respiratory and vocal tracts took place that seem to allow for the production of modern speech. It is suggested that bipedalism would have freed the hands for functions other than locomotion, including their use in expression. Armstrong and Wilcox end their discussion of this range of findings by saying "from this evidence it seems reasonable to conclude that the earliest language-like behavior of the hominids involved visible, especially iconic and indexic manual signs..." (p. 30).

5 The problem of speech

Several different lines of evidence, then, can be added up to support the hypothesis that the first step in the evolution towards linguistic expression was taken with the employment of visible action, or gesture, for referential expression. Yet, as has often been pointed out, this seemingly attractive hypothesis faces, as MacNeilage (1998: 232) has put it, an insuperable problem. Languages are overwhelmingly *spoken*. Furthermore, humans appear to be specialised anatomically to be speaking animals (Lenneberg 1967, Lieberman 2006). If language first emerged as visible gesture it seems puzzling that *speaking* is its specialised and preferred modality.

Armstrong and Wilcox, although they recognise this problem, offer little that is very convincing in their attempts to overcome it. First of all they argue that there is no fundamental difference between 'speech' and 'sign'. They do this by exploiting two quite different ways in which the word 'gesture' has been used. This allows them to argue that speech is, after all, just a form of gesture. Most commonly, the word 'gesture' is used to refer to visible bodily actions that are

expressive, and the term is usually applied to expressive actions that are deemed to be more or less voluntary (see Kendon 2004: 7-16 for some discussion of this usage; see also the Oxford English Dictionary, Second Edition 1989). The authors use 'gesture' in this sense, much of the time. However, on p. 33 they adopt a definition of the word that they take from Studdert-Kennedy (1987, p. 77), an advocate of the articulatory approach to phonetics, that "a gesture is a functional unit, an equivalence class of coordinated movements that achieve some end".[7] In the light of this they claim that the issue of a transition from gesture to speech in the history of language evolution is a false problem. They write: "... there was in fact no Great Shift from gesture to speech. ... The difference between visible gestures and speech sounds is not that one is gestural and the other is not - they are both gestural in the sense that both depend upon planned sequences of musculo-skeletal actions" (p. 67). Putting it this way, that is, to say that 'gesture' and 'speech' are the same because they are both accomplished by "planned sequences of musculo-skeletal actions" is merely to utter a truism. It does not provide an answer to the problem. You might as well say that gesture and speech are no different from cutting down trees, stroking cats, driving cars or eating meat with a knife and fork. Such activities are also accomplished by "planned sequences of musculo-skeletal actions". The claim that 'gesture' and 'speech' are the same also completely glosses over the differences in the perceptual processes that must be involved in the comprehension of 'gesture' on the one hand, which involves visual perception, and 'speech', on the other, which involves auditory perception.

Nevertheless, with this attempt to resolve the problem of how a language of gesture might have become a spoken language, no matter how poorly it has been expressed, an important point is being made. This is, that 'gesture' and 'speech' are both voluntary forms of action undertaken with what might be referred to as 'semantic intent'. Later, we will make reference to MacNeilage's (2008) ideas on the origin of speech, according to which the actions of speech are derived from the manipulatory actions of the mouth in the processing and ingestion of food. 'Gestures' (in the more usual sense of the word) may also be derived from manipulatory actions which, furthermore, may be closely coordinated with mouth actions, since both mouth and hand are involved together in the activities of food getting and ingestion. In primates, hands are used to transport food to the mouth, hence close coordination between hand action and mouth action is required. As will be mentioned again later, there is evidence for close relationships between the neurological systems that control the voluntary actions of the hand and those of the mouth. Perhaps mouth actions and hand actions acquired semantic uses

[7] In the passage from which these words have been taken, Studdert-Kennedy is not providing a general definition of word 'gesture' but is clarifying an implication of using this word to refer to motions of the tongue and lips in the production of speech. He argues that an approach that examines speech development from the point of view of how the child comes to be able to make the movements of tongue and lips, etc., that are necessary for speech production, will throw more light on these processes than an acoustic approach. He uses the word *gesture* in this context in the way that is customary among articulatory phoneticians, a use that is quite specialised and has nothing to do with the use of the term as a way of referring to expressive visible action. Just because articulatory phoneticians have adopted the term 'gesture' to refer to the articulatory actions of speaking is no grounds at all for claiming that speech is 'gesture' and thus not really different from what speakers, or signers, for that matter, do with their hands when they speak!

jointly. At some level, they can be regarded as components of a single system. This may be the point that Armstrong and Wilcox are trying to make.

It will be clear that the problem of the transition from 'gesture' to 'speech' which a gesture theory of language origins will have to face will be much greater if one takes the position, as Corballis does, that languages much like modern deaf sign languages were elaborated before *Homo* began to use speech. Although, as we have noted, Armstrong and Wilcox do claim that signed languages were the original form of language, they are not consistent in this view. They suggest that their theory of language origins "does not require a transition from a period in which human ancestors used only visible gestures to one in which modern humans use only acoustic gestures" (p. 37). They continue: "At no time in our evolutionary history did communication take place in a single modality" and they go on to remind us of the work of McNeill (1992), among others, that makes it "quite clear that humans gesture while they vocalize (p. 37)." This is, of course, a matter of common observation. McNeill is worthy of mention here, however, not as an 'authority' who confirms an obvious fact but because, in his work, he has shown that gesture and speech are *co-produced* as if, that is to say, they are "two aspects of the same process of utterance" (Kendon 1980). Hence gestural expression and spoken language expression are related at some very deep level.

Armstrong and Wilcox thus recognise that the multimodality of linguistic expression they propose for our ancestors has persisted among us to this day. They suggest, however, that in the course of evolutionary history, there has been a shift in the "relative informational load carried by visible versus audible gestures" (p. 37). They speculate that this shift might have come about as tasks such as food-gathering and food-processing and tool-making, which must be transmitted to the young, become ever more complex to explain. Here they refer to an idea put forward by Barbara King (1994) that processes of "information donation" from old to young would be selected for among primates, as changes in the kinds of environments exploited were linked to an increase in variability and flexibility in food getting strategies, as well as the use of tools. If language is mostly carried out in visible gesture, this will interfere with manual tasks. If the informational burden shifts to the vocal channel, however, the hands become free to engage in manual tasks while, at the same time, what is being done can be explained to the young.[8]

They also add some of the other reasons that are usually given as to why speech was selected for, rather than gesture, such as the greater energy efficiency of speech, the fact that with speech one can communicate in the dark or from behind rocks or round corners, and the like. As MacNeilage (1998: 232) has pointed out, however, if these reasons can explain why we have speech, they could also be adduced to argue that we would never have begun with gesture as a modality for language in the first place. The postulation of a gestural language as a stage that precedes spoken language seems, thus, superfluous (see also Bradshaw 2003). Modern sign languages (produced, as they are, by modern humans with all the benefits of human evolutionary history behind them) can be understood as latter

[8] A similar idea has been suggested by Corballis. He thinks that the great late Pleistocene "explosion" coincided with a shift to spoken language. All those cultural productions now became possible because the hands were freed, at last, from the burdens of signing.

day adaptations. They reflect the ingenuity and flexibility of the language faculty, but they tell us nothing about the *origins* of that faculty.

I find it hard to see how this last point can be refuted. However, perhaps the main claim that Armstrong and Wilcox are making is that, although modern sign languages cannot tell us about the *origins* of the language faculty, they can tell us a great deal about the *nature* of that faculty. They can make clear for us the processes by which languages form, not in historical terms, but in terms of the cognitive capacities and processes that are necessary if human languages are to come into being at all and which are continuously and currently involved in the processes by which languages are acquired and maintained in modern humans. Armstrong and Wilcox suggest that if we can see how pictures become graphic units in a writing system or how depictive gestures and pantomimes become signs, if we can see the rules of syntax emerging through a process of ritualisation and abstraction from mimetic representations of events in visible gesture, the implication is that the development of vocal lexical items and their syntactical organisation must follow a similar course. Spoken language, too, must arise from forms of vocal action that are not, in the first place, 'language'. Indeed, Armstrong and Wilcox assert that "the processes at work in the elaboration of signed languages are analogous to what occurred and continues to occur in the evolution of speech" (p.31).

6 Sound symbolism

Surprisingly, they say very little in support of this claim. The best they offer in their account of how speech came about as a vehicle for language is to suppose that by some process of association vocalisations that co-occurred with gestures gradually came to stand for the things the gestures referred to. This, combined with the fact that using speech is so much more convenient in many ways (as noted above) is offered as a sufficient explanation for the establishment of spoken language and its modern predominance. Yet, if they are right, we ought to be able to see that the forms found in spoken languages show evidence of being emergent products of the same processes that the authors show to govern the emergence of signed languages and writing.

I suggest that, in fact, there is plenty of evidence that supports this claim. This may be found in the cluster of phenomena in spoken language that is often (and somewhat misleadingly) referred to as "sound symbolism". That is, the cluster of phenomena in spoken language that shows that, in many different ways, there is often a relationship between the phonological forms of speech units and their meanings. Although the phenomena of "sound symbolism" are commonly downplayed by many linguists, or looked upon as being only of marginal interest, there is evidence that suggests that the "sound shapes" of language (Jakobson and Waugh 1979) often are not unrelated to meaning and, in consequence, may play a role in how spoken language functions that should not be ignored. As Hinton, Nichols and Ohala (1994:1) observe "sound symbolism plays a considerably larger role in language than scholarship has hitherto recognized". Janis Nuckolls (1999) notes that a 'paradigm shift' is underway. As she has written elsewhere (Nuckolls 1996), referring to her work on Pasteza Quechua, but this seems to me to have an entirely general application, "Sound...is a modality for representing the natural-

ness or unnaturalness of perceptual experience. The movements of the mouth, the shaping of the vocal tract, the fluctuating pitch of the voice are all uses of the body to imitate movements and processes of perceptual experience." (p. 5). Putting the voice and vocal tract to work in the service of such representations of movements and perceptual experience appears to be fundamental to the emergence of spoken languages.

The literature on "sound symbolism", or "phonosemantics" as it might be better to call it, is diverse and vast (see, for example, Wescott 1971, Jakobson and Waugh 1979, Nuckolls 1999, Hinton et al. 1994. For an historical discussion see Genette 1995). Despite the widespread adherence to the doctrine of the arbitrariness of the linguistic sign, there has persisted in linguistics a strong countercurrent that asserts that, indeed, meaning and the sounds of speech shape each other. This countercurrent has found expression in a number of the important voices of modern linguistics, including Sapir (1929), Jespersen (1922), Jakobson (1971), Bolinger (see papers reprinted in Bolinger 1965), among others. Notwithstanding, no coherent framework has yet emerged which makes it possible to see how the phenomena of phonosemantics can be integrated with structuralist accounts of language. Possibly it cannot be fully integrated and it may be that we will have to conclude, as Nuckolls suggests, that "languages...[are] essentially heterogeneous systems in which meanings are conveyed using a combination of elements...". However, there does seem to be a persistent set of forces that pull the sets of actions we use for linguistic expression toward a kind of systematicity and, as they do so, they tend to override the "imitation of movements and perceptual experience" and obscure the expressivity which, however, never stops welling up from the efforts of individuals to make themselves understood, to make themselves enjoyed as entertaining foci of attention, and to present their perceptions, thoughts and experiences in ways that are, for others, vivid and involving. These efforts, ultimately, do not take as their starting point the formal rules of phonology and syntax. Givón is surely right when he suggests that "iconicity [is] the truly general case in the coding, representation and communication of experience, and symbols a mere extreme case on the iconic scale." (Givón 1985: 214). Modes of expression, insofar as they establish themselves as socially shared systems, tend toward a systematicity that schematises, abbreviates, and regularises, but this never completely obscures the "iconicity" which is almost always its starting point. Armstrong and Wilcox have shown this clearly for systems that use the kinesic modality. When we look in the right way, however, we can *also* see this in the modality of speech.

Perhaps the most widely attested feature of spoken language which shows a motivated link between sound and meaning is the phenomenon of "ideophones", sometimes also referred to as "expressives", "onomatopoetics" or "mimetics." This class of verbal item was first described by Doke (1935) for Bantu languages of Africa, and he it was who first called them 'ideophones'. However ideophones have since been described and shown to be widespread in a large number of different languages throughout the world, including Australian languages, South Indian languages, Korean, Japanese, several languages of South America and also of North America (see Voeltz and Kilian-Hatz 2001). They are less common in Western European languages, although English, for example, can certainly be re-

garded as making use of them, as in 'sound words' such as "boo", "bah", "bam", "wham" and so forth. In English, however, as also, for example, in Swedish, such expressions tend to be employed mainly in whimsical, playful or childish speech or in the speech of adolescents (Nordberg 1986), whereas in the many other languages mentioned in which they have been described they may play a common role in everyday discourse and even in formal discourse.

In many languages, although not in all, ideophones have special phonological features and they often are isolated syntactically within the sentences in which they occur. Semantically, they often function rather like adverbs. Their origins perhaps may be understood in terms of the processes of physiognomic perception in which similarities between referent and sign vehicle are actively constructed. Their usage is not always and only to express concrete experience or concrete aspects of manner of action, however. As Nuckolls (1996) has shown for Quechua they can serve in the expression of grammatical aspect such as completiveness. Although they have been widely described, there is as yet no generally accepted theoretical framework by which they can be incorporated into linguistic theory and many linguists regard them as standing outside the rest of language. Diffloth (1994: 108), for example, writing of what he calls 'expressives' in a Vietnamese language, suggests that they "constitute a parallel sublanguage grafted on and parasitic on, the conventional one."

However they may be regarded, ideophones provide an excellent demonstration of how vocal expressions can be constructed in a highly iconic fashion and yet be used as an integral part of normal spoken discourse. It is notable that in a number of languages it can be shown that many parts of speech, including verbs, adverbs and nouns are derived from ideophones (see, for example, McGregor 2001), attesting to a process in spoken language of 'ritualisation' similar to the process referred to by Armstrong and Wilcox by which lexical items in a signed language can often be shown to be derived from more directly analogue forms of visible bodily expression.

In almost all the languages that have been described, phonosemantic phenomena in phonology, morphology and syntax of one sort or another have been attested (Ciccotosto 1991 provides thorough survey). Various attempts have been made to identify the different kinds of phonosemantic phenomena. Hinton, Nichols and Ohala's (1994) classification provides a useful guide. *Imitative sound symbolism* or onomatapoeia includes the many groups of words that represent sounds that occur in the environment - in English we have such words as "crack", "bang", "swish", "tap", "knock", and the like. All languages have forms of this sort but since they are assimilated to each language's phonology, or follow different conventions, similar kinds of sounds may be represented onomatapoetically in different ways. It is nevertheless clear that sound imitation is a widespread mode of word-formation. *Synesthetic sound symbolism* refers to cases in which phenomena that are not acoustic receive a correlative acoustic representation. The most widely attested evidence for this is in so-called "magnitude symbolism" in which words for small things tend to have high front vowels (tiny, petit, piccolo) where words for large things have low back vowels (huge, grand, etc.) Although many exceptions can be adduced, this kind of magnitude sound-symbolism appears very widespread in the world's languages (Ultan 1978). Finally, there is so-called

conventional sound symbolism in which certain phonemes or clusters of phonemes come to be associated in groups of words which share a common semantic theme. These are sometimes referred to as 'phonesthemes', a term first introduced by J. L. Firth (1930). In English we find, for example, words that begin with gl- cluster around the theme of light, as in glow, glimmer, gleam, glisten, glimpse. Likewise, there are other groups of words ending in -sh that cluster around the theme of a process of object transformation through violent action in which the object is transformed into small pieces or loses its shape, as in bash, crash, crush, squash, squish, and the like. As Waugh (2000) suggests, this is a widespread feature of English (see also Magnus 1999 and her *Dictionary of English Sound* accessible at http://www.trismegistos.com/) but it is also widely found in other languages (for a thorough description of it in Indonesian see McCune 1983).

At the morphological level, various kinds of iconicity have been described. Reduplication, for example as a form of pluralisation, is a very widespread device. In English it tends to be used to express the idea of repetitive or reciprocal actions of various kinds, and in such cases reduplication is partial, since there is a vowel change from one part to the next, as in flim-flam, zig-zag, flip-flop, dilly-dally, see-saw, and the like. As has been pointed out by Wescott (1971), among others, plural forms are often longer than singular forms (ox vs. oxen, cat vs. cats, to give English examples), and similarly, intensification of adverbs or adjectives is often accomplished by increasing the number of syllables (as in Italian we have lungo, lunghissimo, caro, carissimo, etc.). At the syntactic level, as has been extensively demonstrated by Haiman (1985), among others, there is much evidence for the widespread use of a diagrammatic iconicity.

Phenomena that support the idea that there are systematic relations between the form of a linguistic expression and its meaning, are thus very widespread. The relations uncovered can be characterised in terms of a number of different 'iconic devices', as we have seen, which include sound imitation, synesthetic relations, and relationships that can be described as 'diagrammatic' (as in the case of reduplication or word lengthening for pluralisation, or syllabic doubling with vowel alternation that express repeated alternating actions). That this is so makes it clear that processes akin to what Werner referred to as 'physiognomic' processes are foundational in the creation of spoken language. As we have seen, Armstrong and Wilcox show that they are also foundational in sign language creation. It needs to be said, however, that if it is accepted that what lies at the start of language creation, in whatever modality, is the capacity to create referential actions following iconic principles, this is, of course, not a claim that languages in their contemporary function are no different from imitation and pantomime. The 'iconic hypothesis' might account for how language begins and it may account for an important component of the way in which languages continue to function, change and grow, but there are obviously many other factors at work as well.

7 Iconicity in language: signed and spoken

Armstrong and Wilcox, in their discussion of iconicity in sign language point out that a sign that is iconic is not therefore also *not* symbolic, that is, it is not therefore also *not* conventional. This is a point that Peirce himself recognised and has

received modern discussion in Eco (1976). We can, in fact, set up a scale in terms of which signs may be said to be more or less conventional. This is as true in spoken signs as it is of gestured ones or graphic ones (compare the 'wild-tame' scale for sound words suggested by Rhodes 1994). As Diffloth (1994: 113) has written in reference to his analysis of expressives in Bahar (a language of Vietnam) in which he finds that high front vowels tend to be associated with expressing largeness while low back vowels tend to be associated with expressions of smallness (the reverse of the usual pattern), "two languages may easily use the same phonetic variable (vowel height) to convey the same range of sensations (size), and come up with exactly opposite solutions, both being equally iconic; all they need to do is focus upon different parts of the rich sensation package provided by articulatory gestures, in our case the volume of the tongue instead of the size of the air passage between it and the palate. Iconicity can be both physiologically motivated and culturally relative at the same time." This is exactly analogous to what is found in signed languages. An example often used to illustrate this is the comparison of the sign for 'tree' in American Sign Language, Danish Sign Language and Chinese Sign Language (see Klima and Bellugi 1979: 21). In ASL an erect forearm with a spread hand is used (depicting a vertical trunk with spreading branches at the top), in DSL the two hands together outline a sphere with a strait narrow object below it, in CSL the two hands posed with thumb and forefinger abducted and facing one another move upward, as if moving upwards along a vertical cylindrical object. In all three SLs certain features of a tree are abstracted, but different features are chosen in each case and a different mode of representation of these features is employed in each case. All three signs are 'iconic' since there is a relationship of resemblance between the actions of the sign and the features referred to in each case. At the same time all three signs are conventional. In Peircean terms, they are at once icons *and* symbols. Numerous other examples can be found, drawing on many different sign languages, that illustrate the same point.

As Armstrong and Wilcox explain, there has been, in sign language linguistics, a great reluctance to admit the importance of the role iconicity in sign language because most sign language linguists (and others) have adopted the dogma that for a sign to be truly linguistic it must be arbitrary. Because students of sign language since Stokoe's pioneering work have been anxious to demonstrate the true linguistic status of signed language they have been afraid to admit the role of iconicity because to do so, they feel, would undermine its linguistic status and throw it back to a view of it as "mere gesture", and therefore unworthy of being a serious medium of expression, instruction and thought. The work of Armstrong and Wilcox, among others, is contributing to a shift in this attitude, and, as we have already mentioned, a number of sign language linguists such as Sarah Taub, Christian Cuxac and Scott Liddell, among others, are now recognising the central importance of iconicity in signed languages. Oddly enough, spoken language linguists are likewise nervous about iconicity in spoken language, although for different reasons. The caution with which they treat the topic of phonosemantics, for example, is based on the way in which it is apparently in conflict with the principle that sounds function in language solely to keep linguistic units apart and do not serve to convey meaning in themselves. As Jespersen (1922) has also pointed out, the willingness of most linguists to dismiss iconicity as a princi-

ple of any importance in spoken language derived also from de Saussure's argument that words in current speech that seem to be phonically iconic can often be shown by their etymological history to be descended from words that do not seem to have such iconicity. Jespersen comments, however, that "modern linguistic science...is so preoccupied...with the origin of words, that it pays much more attention to what words have come from than to what they have come to be. If a word has not always been suggestive on account of its sound, then its actual suggestiveness is left out of account and may even be declared to be merely fanciful." (p.410). Jespersen demonstrates in his chapter on Sound Symbolism however, that the sound suggestiveness of words, whatever their etymologies may be, can play an important role in how they are used, how they relate to one another within the language contemporaneously, and what sort of survival history they may have within a given speech community. Bolinger, in several papers (reprinted in Bolinger 1965), provides a further exploration of this theme. As we have seen, recent and current work, especially anthropological linguistic work which is being done on many different languages in many different parts of the world, both supports and amplifies Jespersen's observations. It seems that a way of thinking about language is needed in which both the creative force of iconic representation (at every level) is acknowledged as well as the tendency toward systematicity that often overrides such representation. This tendency, also ever present, of course, derives from the nature of language as a social institution. As Nuckolls (1999: 246) concludes, the evidence points toward a "view of language as a system structured by competing tendencies." This is certainly the view that Armstrong and Wilcox provide us with for signed languages and it seems clear from the work in spoken language linguistics we have just been referring to that these can be viewed in just the same way.

Such considerations might suggest, thus, that in both the medium of visible action and in the medium of vocalisation, similar representational processes of a mimetic or iconic type are in operation. Armstrong and Wilcox indeed suggest this and they claim, on the basis of this, that spoken languages and signed languages form a unity. However, there is a further aspect that can be brought in which further strengthens the idea that there is a unity between signed and spoken language, and that is that actions of the mouth and manual actions enter into some kind of synergistic relationship with one another.

8 Synergies of hand and mouth and the 'tongue gesture' hypothesis

Armstrong and Wilcox do make some reference to work that suggests that neural control systems involving the mouth actions of speech and those involving actions of the forelimbs perhaps have features in common. They do not mention, however, the recent work of Gentilucci and colleagues in which mouth action and hand action synergies have been demonstrated. In a series of experiments (see Gentilucci and Dalla Volta 2007 for a review), Gentilucci and his co-workers have reported observations that suggest that forms of action made by the mouth can be paralleled by forms of hand action. Thus if a person is asked to simultaneously pick up a small object (such as a cherry) and pronounce a syllable such as 'Ba'

as he does so, he shows a tendency to use a smaller mouth opening than if the simultaneous hand action is to grasp a large object, such as an apple. And, by the same token, simultaneous grasping actions of the hand may be smaller if the syllable to be pronounced is 'Bi' rather than 'Ba'. Such observations seem to suggest that there is a kind of co-ordination in the control system that govern hand and mouth actions. Gentilucci and colleagues have speculated that this kind of hand-mouth co-ordination came about in evolution as a consequence of the use of the hands to transport food to the mouth. They suggest it may be phylogenetically very old, perhaps having its origins from the time when primate ancestors began to live in trees in a three dimensional manner. Using hind-limbs and one forelimb to hold on to, the other forelimb could be freed to reach for and grasp fruit or other food items, which would then be transported to the mouth by the hand. Such a mode of food getting could facilitate the development of hand-mouth co-ordination control systems and, so it is suggested, it is in this that lies the origin of the neuro-motor mouth-forelimb synergies that various lines of observation suggest, including those of Gentilucci and his colleagues.

In such an approach we may see the origins of what makes possible a kind of paralleling of mouth and hand action. Indeed, it is in this that we might have an idea about how expressive actions in visible action systems such as the forelimbs could have come to be transferred to actions of the mouth. In supposing that, in speech, we can see in operation processes that transform mimetic or iconic expressions into systematised and schematised forms of action that have 'linguistic' features, as several writers have pointed out, this need by no means needs to be confined to *sound* imitations only. Undoubtedly onomatopoeia has played and continues to play a role in word formation processes, as the survey above shows, but, as Paget (1930) pointed out a long time ago, motions of the vocal articulatory apparatus can also be made that parallel the actions in space of the hands. If there is vocalisation during actions of this sort, the aural consequences will differentiate accordingly and the patterns of sound resulting, though not like patterns of sound such as the cry of animals and the like, are nevertheless consistently correlated with changes in the geometry of the vocal tract. It is in terms of this idea, for example, that one might account for the origins of the association found in many languages between high front vowels and smallness of size. Several scholars have, in the past, sought to trace in mouth actions mimic representations of various kinds. Before Paget made this suggestion, in 1862 John Rae had proposed it in relation to material he had assembled for a Polynesian language (Rae's monograph on this was published as an appendix to Paget's book). The idea had also been proposed by Alfred Russell Wallace (1895). Scholars of language who have pursued the same idea include Johannesson (1952), who proposed the tongue gesture theory for language origins on the basis of an analysis of Indo-European roots. A somewhat different approach was followed by Mary LeCron Foster (see, for example, Foster 1992, 1999). Some additional support for this idea may also be found in Bencie Woll's (2001) suggestion that what she has termed 'echo phonology' in sign language, in which a manual sign is combined with an action of the mouth which has dynamic features that have something in common with the hand actions of the sign, could provide an example of how a spoken form can be derived "quite naturally" from a gestural form.

However, even if the 'tongue-gesture' idea were to be accepted as a plausible way of accounting for how mouth actions got involved in the production of referential gestures and in this way allowed for the preservation of the idea of the 'gestural origins of language' when the original 'gestures' were made both as visible actions and as mouth actions - these mouth actions having aural consequences in the way they modified the concurrent vocal output (in this way, thus, avoiding the problem that a gesture-language-first scenario poses), we still need to add something that allows us to understand how the actions of the mouth and associated vocalisation came to be available, as it were, so that they could be recruited into the referential gesture function. For this to be possible an elaborate and voluntary control of the vocal system must already have been in place. In other words, a scenario for the evolution of the human speech apparatus and its neuro-motor control systems is also needed.

For this we may turn to MacNeilage (2008) who presents a scenario in which speech is seen as deriving from rhythmic open-closing mouth actions that have their original form in the mastication of food. As he reminds us, among primates extensive use is made of mouth and tongue actions in communication which are distinct from use of the mouth in the production of calls. Many species of monkeys and apes use mouth gestures such as lip-smacking, tongue protrusion or lip protrusion, some also engage in low volume "grunting", the acoustic properties of which may be modified with tongue actions. Already, widespread in various primate genera, thus, complex mouth actions are being used in communication, in forms of action that are under voluntary control. MacNeilage sees these as deriving from rhythmic mandible oscillations that ultimately originate in the action systems involved in mastication.

Speech, however, even if it is the dominant vehicle for language, must be regarded as but a component of language. As the existence of sign languages demonstrate, we can have languages that do not involve speech. A scenario for the evolution of speech, in particular, thus, will not be the same as a scenario for the evolution of other language components, such as a capacity for the production and understanding of symbolic actions.

9 Common features of signed and spoken discourse

This, then, is one way in which we can explore the issue of the unity of spoken language and signed language. There is another way to approach this question, however, and that is through comparisons with how signers and speakers construct their discourses. This is also something that Armstrong and Wilcox could have made more of in their discussion than they do.

If, in comparing signed discourse with spoken discourse we compare directly actual *performed* spoken discourse with signed discourse we can see how, in both speakers and signers, extensive and flexible use is made of a range of expressive resources, many of which are highly analogous to one another, if not actually the same (see, for example, Kendon 1993, 2004: 307-325 and see also Enfield 2004). For example, speakers employ certain kinds of well-established gestures to express certain kinds of grammatical functions, such as negation (Kendon 2002b, 2004: 248-264), interrogation of various kinds, topic-comment marking and focus

marking (Kendon 1995, Kendon 2004: 225ff), they inflect their deictic gestures with different kinds of handshapes to mark the discourse status of the objects they are making reference to (Kendon and Versante 2003, Kendon 2004: 199-224; Wilkins 2003) and they can employ descriptive gestures as if to display objects of reference in their discourse and show certain properties of them in ways that appear to parallel the way in which so-called 'classifiers' are used in signed discourse (see Kendon 2004: 316-324). These various kinesic devices just referred to can be employed simultaneously with the unfolding of speech, they can serve to 'bracket' stretches of discourse as a way of indicating its status in much the same way that signers can, when they use facial actions or head actions to mark interrogatives, subordinate clauses, or negations (McClave 2001). Furthermore, speakers may employ their hands to mark out contrasting spaces to refer to different actors in a narration (Gullberg 1998; Kendon 2004: 310-315) or to establish different spaces for different components of an argument (compare the common expression "on the one hand...on the other hand"). As Calbris (1990) and Kendon (1993) have described, speakers use their hands to indicate different kinds of spaces and different kinds of progressions along virtual lines in space to indicate different time locations and movement through time, mapping out a temporal spatial layout which matches closely that observed in sign languages such as American Sign Language, French Sign Language or Italian Sign Language and British Sign Language). As I conclude in Kendon (1993): "The parallels between how space is used to express time in verbal metaphor, gesticulation and sign that we have illustrated suggest continuities between spoken language expressions, gesticulation and sign language, as if these modes of expression are all drawing on the same representational substrate." I suggest, accordingly, that symbolic representation by way of spoken language and symbolic representation by way of gesture, including sign, "appear less widely separated than might at first be thought. They may be regarded as different elaborations of a common underlying process" (p. b13).

Much more recently, sign language researchers have begun to confront in a systematic way the phenomenon of "simultaneity" - the way in which, in sign language discourse meanings are often built up with combinations of strands of simultaneously organised hand, face, mouth and head actions, of shifts in bodily stance and orientation (Vermeerbergen, Leeson and Crasborn 2007). The parallels with what speakers do, as is clear if we consider the detailed descriptions of gesture use in speakers to be found in Kendon (2004, see especially Chapters 8-13 and Chapter 15) as well as in the work of people like Isabella Poggi (Poggi 2007) make it clear that "simultaneity" is far from being a characteristic only of users of signed language. Speaker discourse performance also can involve a great deal of simultaneous expression. It is clear that a programme of collaborative and comparative work in which signed discourse and spoken discourse is directly compared *as performances* will show that there is very great overlap in how signers and speakers organise their linguistic expressions. As I conclude in Kendon (2004: 325): "As we speak or sign we constantly mix in with our discourse all manner of expressive devices, some more, some less well patterned. Signers use words and syntactic constructions, but they also modulate their performance of their signs in various ways, employ 'classifiers' and pull in kinesic expressions of all kinds, some from the kinesic vocabulary of the wider community, some improvised. Speakers act

similarly. They use words and syntactic constructions, but they also use intonation patterns, voicings and vocalisations. And when they use gesture they reach out for strategies of expression that are also found in sign languages." If this view is correct it surely argues that 'sign' and 'gesture' and 'spoken expression' (lexical, prosodic, 'vocal gestural' and so forth) all spring from the same source. Sign languages may emerge only in particular circumstances, yet how they do so and the manner in which their users construct their utterances, follow principles of formation and performance that are of a piece with those used by speakers. Hence we see a unity in speech, sign and gesture and we see, furthermore, that they are interwoven together in a kind of complex tapestry.

10 Conclusion

Where does all this leave us with respect to the theory of the "gestural origin of language"? Armstrong and Wilcox have provided us with a concise up-to date summary, for the most part clearly written, that shows very well why the study of signed languages is making so important a contribution to our understanding of the capacities that are involved in the creation of language. They provide excellent support for the position outlined by Tylor (1865), for example, which claims that in the study of communication systems in the kinesic modality we can observe the processes by which communication systems come to acquire the cluster of features which leads us to attach the term 'language' to them. However, this should not be confused with an account of how 'language' actually emerged in the course of the history of the human species. All of the processes that Armstrong and Wilcox point to depend upon cognitive capacities that modern humans already have. To show how these cognitive capacities arose historically will require arguments and evidence different from those that have been provided in this book. Since such arguments and evidence can never be provided definitively, however, we may expect to see many more publications offering solutions to the problem of language origins.

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Conceptual blending and sign formation

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Abstract

In this article I will investigate the process of conceptual blending involved in sign formation. The main objective of this article is to demonstrate that conceptual blending theory is capable of accounting for the creation of both linguistic and non-linguistic signs from pre-existing semiotic inventory. Moreover, like in the case of logos and names of certain products, the conceptual mechanism behind the formation of linguistic and non-linguistic signs is similar not only in general aspects, but also in fine-grained details. This statement is by no means paradoxical. The theory of conceptual blending strives to describe the basic conceptual mechanism responsible for the semiotic capabilities of the human mind and is not intrinsically connected with any specific type of signs; thus, cognitive strategies which prove to be effective for the creation of, for instance, graphic signs may be reused for the creation of linguistic signs.

Keywords: logos, blending, cognitive

1 Introduction

In this article we will examine the process involved in the creation of novel signs from pre-existing semiotic inventory. This type of process is not uncommon; few signs are formed in complete isolation from other signs or are devoid of any motivated relationship with existing structures. The main thesis of this article may seem paradoxical – my intention is to demonstrate that in some cases signs of different types, like linguistic and graphical ones, may be created in similar way and that there are significant parallelisms in the conceptual mechanism underlying formation of these types of signs. These parallelisms can be described in a systematic and methodologically coherent manner. Material analyzed in this article consists of logos and names of Linux based-computer operating systems and theoretical framework adopted for the purpose of the analysis is the theory of conceptual blending devised by Gilles Fauconnier and Mark Turner.

Before we proceed to the case studies, it may prove useful to have a quick look at Linux itself. "Linux" is a customary name for a vast array of computer operating systems or, to be more precise, the core components of an operating system known as **kernel**. The kernel is the most important "layer" of an operating system responsible for coordinating components of hardware. In principle, kernel is a complete, self-contained and functional operating system, but in practice its usability is limited due to the fact that it does not contain any graphic user interface (abbreviated as GUI), let alone any "desktop" applications. Thus, virtually all widely-used Linux operating systems have another layer, a more intuitive graphic user interface called **desktop environment**, and additional programs,

like word processors, spreadsheets, etc.[1] A complete system, including a kernel, a user interface and additional applications is a **distribution**.

An important difference between Linux-based and other operating systems is the modularity of the former. Modularity is often explained via a building blocks metaphor; in principle, a distribution may be created from scratch through arbitrary assemblage of components. Thus, users may select any kernel, combined it with any desktop environment and any additional software they find necessary. Moreover, one distribution may be equipped with more than one desktop environment, which can be freely toggled. Nevertheless, building a customized distribution requires considerable knowledge and programming skill, therefore, for the sake of convenience, most distributions come pre-assembled with a GUI and most useful applications.[2]

One of such distribution is Ubuntu, an operating system with a Linux kernel and a desktop environment called GNOME. Ubuntu was designed to be user friendly, easy-to-use and aesthetically pleasing. The effort of the authors was appreciated by users and the distribution became a tremendous success – currently, it is one of the most widely used distributions in the world. The success was so great that the authors decided to launch another project aiming at creating an operating system with similar collection of applications, but equipped with an alternative desktop environment called KDE. This new distribution was called Kubuntu. Unfortunately, both distributions were rather demanding on hardware and not suitable for older machines. Hence, Ubuntu developers decided to release another Ubuntu derivative, Xubuntu, with a light-weight desktop environment called XFCE. Soon Ubuntu and its derivatives became so popular that independent programmers started to create other Ubuntu-based distributions, which were not officially supported by the authors of original system. These versions feature other desktop environments or additional software not included in official releases.

It is worth mentioning that the difference between various desktop environments lies not only in appearance, but, more importantly, in functionality. Despite of the fact that most of Ubuntu derivatives are equipped with a different desktop environment, they are based on the same core components, which makes them similar in many ways. From the semiotic point of view, this situation should be reflected both in names and logos accompanying every distribution. Indeed, as we will soon see, semiotic inventory associated with every distribution attempts to highlight both differences and similarities between various derivatives. This effect is achieved through harmonious composition of seemingly dissimilar elements of various signs. Moreover, the process responsible for composition of signs is essentially the same for both linguistic and non-linguistic signs (names

[1] Strictly speaking, the matter is slightly more complicated, as a typical desktop operating system consists of three layers – kernel, window manager and desktop environment – although in some cases it is difficult to clearly delineate the last two. In addition, the word "layer" is metaphorical, far from technical precision and would probably never be used by a software developer. Nevertheless, for the purpose of this article let us accept this slightly simplified view.

[2] Particular components of a distribution can be manipulated freely due to less restrictive copyright policy adopted by developers of Linux related software. Most of the elements, including the kernel, most of desktop environment and an overwhelming majority of the additional programs are released under open licenses. Software under such licenses are free of charge and may be freely modified and reused by anyone.

and logos). The process in question is best described within the theoretical framework of conceptual blending.

2 Conceptual blending

The conceptual blending (also known as blending theory – BT), proposed by Gilles Fauconnier and Mark Turner (1995), is probably most frequently employed in the study of language. In linguistics this theoretical framework is used extensively to account for a wide variety of phenomena including, among others, conceptual metaphor, metonymy (e.g. Turner and Fauconnier 2003) and discourse structure (e.g. Oakley 1998). Turner and Fauconnier, however, never claimed that their theory is applicable to linguistic data alone. On the contrary, on many occasions they used conceptual blending to analyze visual data (e.g. cartoons) and cultural images (e.g. the Grim Reaper, both in Fauconnier and Turner 2007). Therefore, it seems reasonable to claim that blending theory is not restricted to any particular type of data, as it grounded in general conceptual and cognitive mechanisms universal for all semiotic activity of the mind.

Conceptual blending makes use of so called **mental spaces**. The notion was proposed by Fauconnier (1985) and can be defined as "a partial and temporary representational structure which speakers construct when thinking or talking about perceived, imagined, past, present or future situation." (Grady, Oakley and Coulson 2007). Despite certain linguistic bias evident in the quotation, mental spaces should not be thought of as phenomena of language alone. Their nature is conceptual rather than linguistic; their usefulness in the study of language is the consequence of the fact that linguistic expressions are phonological manifestations of more general conceptual processes.

Conceptual blending involves (at least) four mental spaces. Two of them are **input spaces** containing semantic structures contributed to the "output" structure. The third space, called **generic space**, embraces a schematic structure shared by both inputs. The content of the generic space represents abstracted commonalities occurring across all input structures, regardless of how dissimilar these structures may appear. The shared structure is a kind of generalization derived at the expense of fine-grained details, which are temporarily suppressed or overridden. These commonalities become the foundation of a new, emergent structure. This novel structure appears in the last space involved in conceptual blending, i.e. **the blended space**. The process is rendered graphically in Fig. 1.

In the illustration the solid lines represent correspondences (i.e. conceptual associations between elements of semantic structures) across input spaces. Corresponding elements are mapped into the generic space giving rise to the shared structure. The blended space recruits the schematic structure of the generic space, giving rise to a more specific construction than fairly general structure of the generic space, as it is elaborated with details from the input spaces. Several points should be made here. Firstly, the blended space combines elements of input spaces, so that components of two separate spaces are "blended" into one structure. This does not necessarily mean that corresponding components are mapped into a single element. The emergent structure should be a coherent array of conceptualization, but it can feature several separate elements linked in

a systematic manner, rather than a single monolith entity. If corresponding elements from the inputs are combined into one element, **fusion** takes place. Fusion is typical for metaphors, in which one entity "becomes" another entity (cf. a metaphorical expression *Time is money*). Secondly, the emergent structure (shown in Fig. 1 as a rectangle inside the blended space) may recruit elements of input spaces which are not mapped into the generic space and have no cross-space correspondences. Additional components may be recruited opportunistically if, for any reason, they are perceived as relevant for the emergent structure. Thirdly, the process of blending is not merely additive. Once the emergent structure is created, it is capable of attracting new semantic elements, absent from the inputs and the generic space. In Fig. 1 these elements are represented as dots "floating" freely inside the emergent structure.

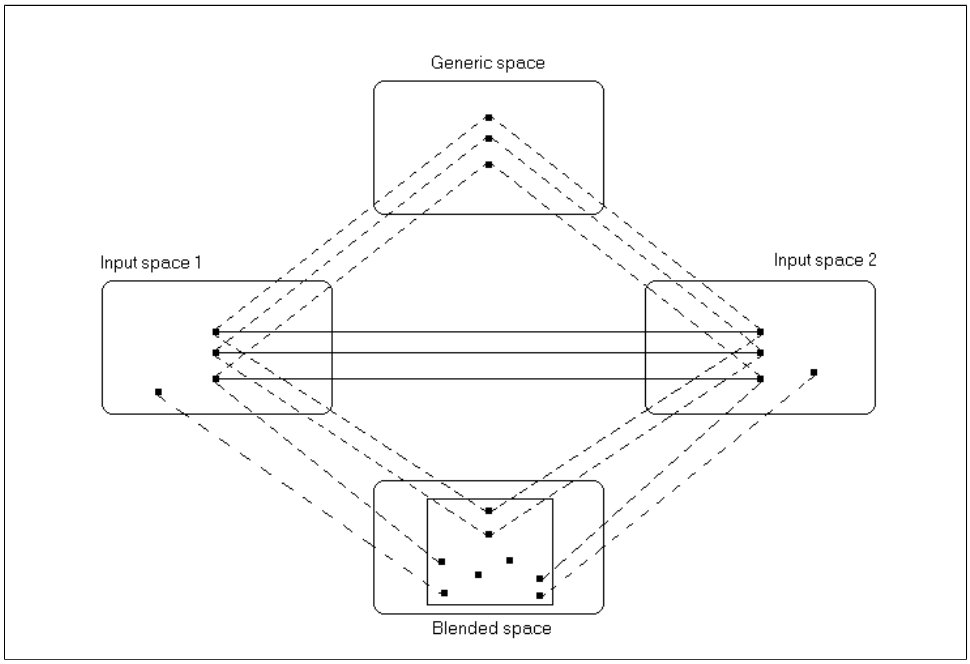

Figure 1.

Let us illustrate these three points with actual linguistic data. The following analysis of (1) proposed by Turner and Fauconnier (2003) has become a classical example of how BT can be used for explaining complexities of metaphorical expressions. The authors examine a metaphorical statement produced in 1998 after an alleged sexual scandal involving President Bill Clinton:

(1) If Clinton were the Titanic, the iceberg would sink.

In this case the conceptual blending features two input spaces: one containing the "Clinton scenario," in which the President survives damage caused by the alleged scandal, and the other including the "Titanic scenario," in which the ship sinks after colliding with an iceberg. The authors summarize the process of blending in the following passage:

> There is a partial cross-space mapping between these inputs: Clinton is the counterpart of the Titanic and the scandal is the counterpart of the iceberg.

> There is a blended space in which the Clinton is the Titanic and the scandal is the iceberg. This blend takes much of its organizing frame structure from the Titanic input space – it has a voyage by a ship toward a destination and it has the ship's running into something enormous in the water – but it takes crucial causal structure and event shape structure from the Clinton scenario – Clinton is not ruined but instead survives. There is a generic space that has structure taken to apply to both inputs: one entity that is involved in the activity and is motivated by some purpose encounters another entity that poses an extreme threat to that activity. In the generic space, the outcome of this encounter is not specified. (Turner & Fauconnier 2003: 133)

Further, the authors notice that some parts of the emergent scenario are not supplied by any of the input spaces (these are the "floating" dots in Fig. 1). Consider the result of the encounter in the emergent scenario, i.e. the iceberg sinking after collision with the ship. Obviously, this element is not contributed by the Titanic scenario; originally, it was the ship that sank, not the iceberg. The Clinton scenario does not provide an explanation either – the President does survive the scandal, but there is no semantic content representing the scandal being "damaged" in any way. This element does not come from the generic space, as the authors state clearly that here "the outcome of the encounter is not specified." What is more, the result of the encounter in impossible and contradicts the content of the "Titanic scenario" – we realize that icebergs do not sink after colliding with ships. Thus, it is legitimate to claim that this part of the scenario is an innovation provided by the emergent structure having no counterparts in other spaces. Novel elements are not uncommon in the blended space; emergent structures are sometimes governed by their own internal "logic," which may override the "logic" of the inputs.

The example demonstrates the already mentioned process of **fusion**. In (1) Clinton and the Titanic are fused into a single object (in the metaphorical understanding, Clinton *is* the Titanic) and so are other corresponding elements, i.e. the scandal and the iceberg. However, the blended space embraces much more than two object; in fact it features a whole scenario, which contains unfused elements as well. Consider the outcome of collision. This element is not a result of fusion, as it is not contributed by any of the inputs. Thus, fusion is not obligatory for creation of the emergent structure – elements contributed by inputs may be incorporated into the blend in a different manner.

Fauconnier and Turner (2007 [1998]) formulated several **optimality principles** governing the creation of conceptual blends. They are summarized neatly by Grady, Oakley and Coulson (2007: 425-426):

Integration:

> The scenario in the blended space should be a well-integrated scene.

Web:

> Tight connections between the blend and the inputs should be maintained, so that an event in one of the input spaces, for instance, is construed as implying a corresponding event in the blend.

Unpacking:

> It should be easy to reconstruct the inputs and the network of connections, given the blend.

Topology:
Elements in the blend should participate in the same sorts of relations as their counterparts in the inputs.

Good reason:
If an element appears in the blend, it should have meaning.

Metonymic tightening:
Relations between elements from the same input should become as close as possible in the blend.

The optimality principles should not be thought of as rigid laws but must be treated with fair degree of flexibility. As the Grady, Oakley and Coulson state, "[there] is a tension among some of these principles, and so each blend satisfies them to varying degree." (2007: 426)

3 Blending and logos

Let us proceed to the analysis proper. In this section we will have a look at logos of Ubuntu-based distributions and in the following section we will examine their names. The starting point is the Ubuntu logo presented in Fig. 2(a). As already mentioned, Ubuntu is a distribution equipped with GNOME desktop environment, whose logo is shown in Fig. 2(b). In this case the process of conceptual blending does not apply, as the Ubuntu logo does not include any elements of the GNOME logo. The reason for this is the fact that GNOME is a default desktop environment of Ubuntu and therefore there is no need of marking it explicitly. Since desktop environment is an important part of any distribution, we may assume that the knowledge about this component is a significant part of the notion of a particular operating system. Consequently, it is reasonable to conclude that notion of GNOME is an essential element of semantic structure representing Ubuntu. In other words, the notion evoked by Ubuntu logo contains implicit reference to GNOME, even though it does not appear in the signifier.

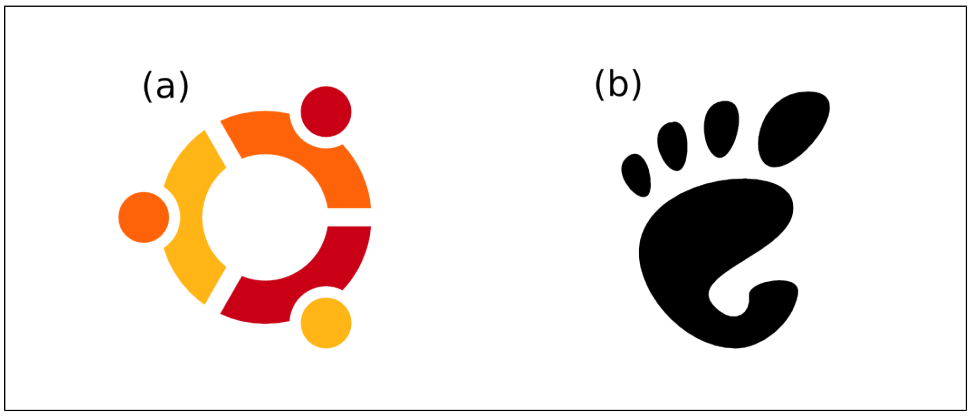

Figure 2. (a) Ubuntu logo; (b) GNOME logo.

The chronologically first derivative is Kubuntu equipped with desktop environment called KDE. Kubuntu and KDE logos are shown in Fig. 3(a) and 3(b) respec-

tively. As we can see, Kubuntu logo is a blend of elements derived from Ubuntu and KDE logos. Input spaces contain graphic structures[3] of Ubuntu and KDE logos. The generic space embraces a schematic structure shared by both signs, in this case this is a round entity. In the Ubuntu space the shape corresponds to (either of) three little circles at the edges of the Ubuntu logo, in the KDE space it is linked to the overall shape of the gear. Abstracting the shared structure from the KDE space requires notable cognitive effort. Firstly, the gear, which is rendered only partially in the KDE logo must be conceptually completed into its full form. This is facilitated by a perceptual phenomenon called **gestalt perception**, in the result of which it is possible to mentally "fill in" parts of known structures which are not present in actual images. Gestalt perception is so pervasive and automated that it operates even when the logo is not considered in the context of conceptual blending. The most natural way of looking at the KDE logo is perceiving it as a combination of a complete gear and a letter, even though only part of the gear is rendered graphically. Certainly, it would be highly unusual to claim that the logo consists of a letter and a part of the gear or a broken gear, even though this is what the sign actually features. Secondly, the depiction of a gear is stripped of fine-grained details, as the generic space should contain a structure schematic enough to be shared by all inputs. In plain words, what is mapped into the generic space is not the concept of a gear as such, but a more general notion of a round structure, which the gear instantiates.

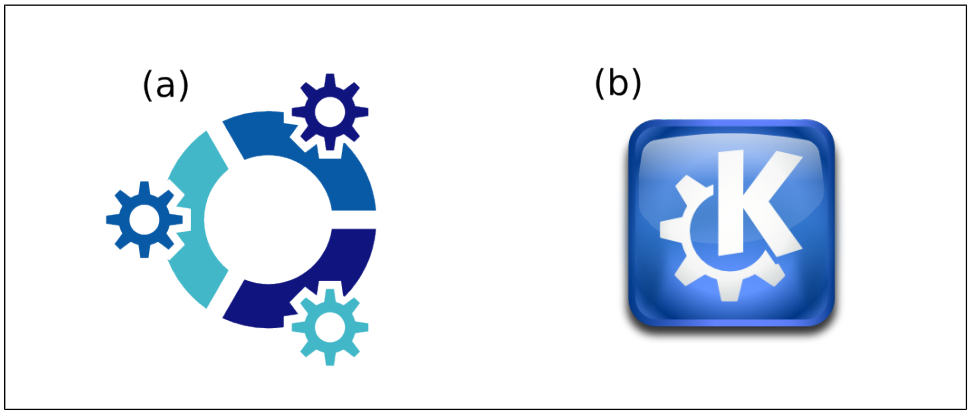

Figure 3. (a) Kbuntu logo; (b) KDE logo.

In the blended space elements from the inputs and the generic space are combined into a one structure (thus, fusion takes place). The round shape from the generic space is elaborated according to the cues provided by the KDE input into a gear and located at the edges of the "circle of three" recruited from the Ubuntu input. In this way, a novel sign combines recognizable elements of both logos. In order to provide additional cues of KDE, the blue color is mapped from the KDE

[3] The term "graphic structure" should be approached with caution. Conceptual blending, being a mental process, cannot involve any material entities. Therefore, through "graphic structure" I understand mental representations of real world entities constructed on the basis of sensory data rather than concrete markings on any kind of physical material. This provision should be borne in mind throughout the whole article.

input.[4] The presence of blue is not merely a fancy on the part of the artist (such a fancy would violate the optimality principle of good reason). As the overall shape of the novel sign is derived from the Ubuntu logo and the KDE components are rather small in comparison to the main circle-of-three, additional elements from the KDE input may be used to bring a conceptual balance to the novel sign. The resulting blend a coherent unified structure; Kubuntu logo is naturally perceived as a single entity, not a loosely knit combination of random elements. On the other hand, particular components of the blend are readily recognizable as recruited from relevant input spaces. These fact reflects the principles of integration and unpacking.

In principle, the process is quite similar in the case of Xubuntu, a light-weight distribution with XFCE desktop environment. The novel logo is a tightly knit combination of elements derived from input signs. The details of the process, however, are slightly different and deserve extended discussion. Fig. 4(b) depicts XFCE logo and 4(a) the logo of Xubuntu. This time it is far more difficult to extract the generic space structure – at first glance, two logos seem to share no elements from which the generic structure may be recruited. As a consequence, the novel sign may seem to be a somewhat random combination of arbitrarily selected components. Nevertheless, after closer inspection, it appears that both input signs share a similar pattern of general spacial organization; more specifically, particular elements of both signs are laid out according to center-periphery scheme. In Ubuntu logo parts of the circle of three are located on the perimeter of a circle around a central point (specific, though not marked graphically). In XFCE logo the background X shape marks the central point of the sign in the place, where the two arms cross. This location is also occupied by the image of a mouse. Consequently, this central point is visually most prominent and the whole image "gravitates" towards the center. As a result, the structure mapped into the generic space is a highly abstract pattern of spacial configuration of particular elements rather than any specific component inherent to both inputs.

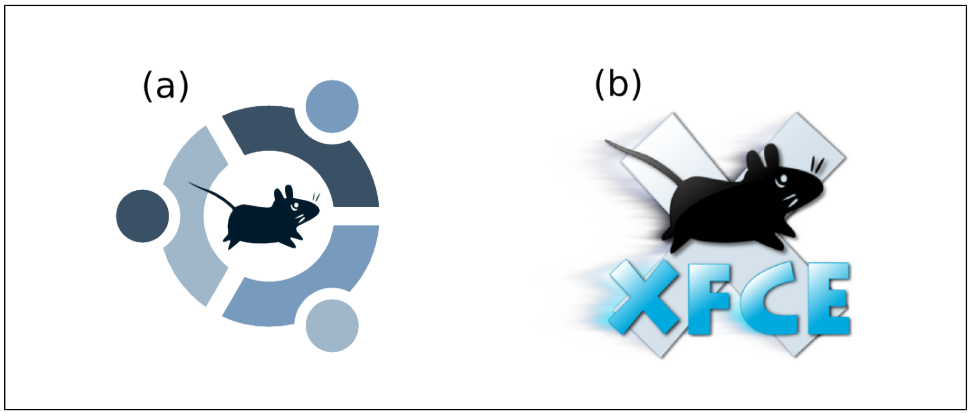

Figure 4. (a) Xbuntu logo; (b) XFCE logo.

[4] This is an instance of the already discussed mapping of additional elements from the input space, which are absent from the generic space and have no relevant correspondences across input spaces.

This schematic pattern is used for organizing the blend. The Ubuntu space contributes the circle of three and the XFCE space offers the image of a mouse; then, the mouse is placed in the same location as in the input space, i.e. in the center, which is conveniently left unoccupied in the Ubuntu logo. This particular location is forced by the optimality principle of topology, which stipulates that the configuration of elements in the blend should reflect the configuration in the input as closely as possible. Once again, the color of the novel sign is contributed by the desktop environment space and constitutes an "added" element, which does not belong to the generic space. The resulting blend is a coherent, self-contained visual image (the optimality principle of integration), whose elements can be easily traced back to appropriate inputs (the principle of unpacking).

Cases examined so far were rather unproblematic. Roughly speaking, the blend was a result of combining elements of two input signs according to a pattern derived from the generic space. This, however, does not apply to all Ubuntu derivative logos. Fig. 5(a) presents the logo of Fluxbuntu, a distribution with Fluxbox desktop environment,[5] whose logo is shown in Fig. 5(b). In this case, the content of the first input space is the Ubuntu logo, but the other space does not include any structures relating to Fluxbox. The content of this particular input space requires a brief explanation. The dominating graphic theme of Fluxbuntu (but not of Fluxbox!) is nature, which most probably is intended to become a distinguishing feature of this operating system. For instance, the dominant color in the graphic user interface is green, the default desktop background features leaves, etc. Consequently, the second input space contains graphic elements which are metonymically linked with the concept of nature, i.e. leaves and color green. Correspondences are drawn between the small circular elements at the edges of the circle of three and small roundish leaves. The content of the generic space is similar to the one of Kubuntu – both inputs contain a small, approximately round element.

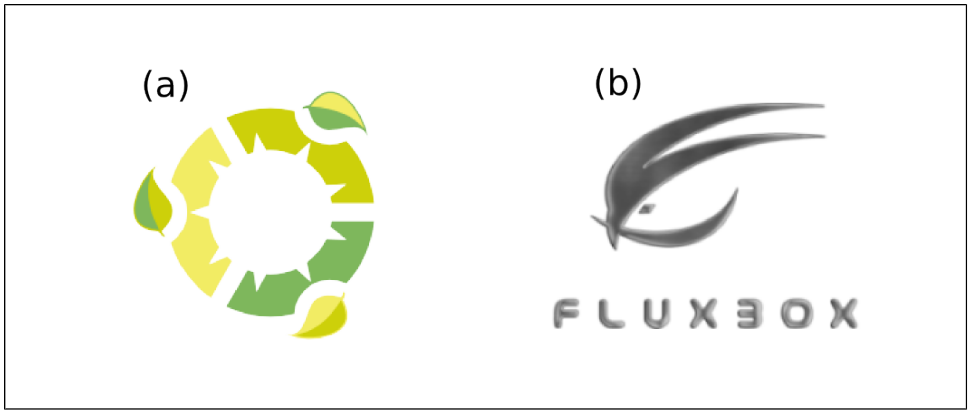

Figure 5. (a) Fluxbuntu logo; (b) Fluxbox logo.

[5] Technically, Fluxbox is not a fully developed desktop environment, but a window manager (cf. footnote 1). However, since technical details of software structure are not terribly important for the purpose of this article, for the sake of simplicity I will continue to use the imprecise term desktop environment.

In the blend the circular elements of the circle of three are elaborated into leaves in the very same way they were worked into gears in the Kubuntu blend. An additional element reinforcing associations with Fluxbuntu is the color recruited from the nature input space. Interestingly, the process of conceptual blending behind Fluxbuntu logo illustrates a different strategy of characterizing a Ubuntu-based distribution. So far, the distinguishing feature of various derivatives was the desktop environment included in the distribution. This is a convenient solution, as desktop environments differ in terms of appearance and functionality providing a convenient basis characterization of particular distributions. In principle, this path was open to Fluxbuntu as well due to the fact that this is the only Ubuntu-based distribution using this Fluxbox desktop environment. However, it is not a must for a logo to encode information about the desktop environment, especially when other salient features are available. In the case of Fluxbuntu, this feature is a unique graphic theme, which provides suitable input to build a recognizable logo.

The last non-linguistic sign discussed in this paper accompanies the distribution called Gobuntu. Its logo is presented in Fig. 6(a). As in all other cases, the "circle of three" from the Ubuntu logo is immediately recognizable. The other component is the well-known sign denoting the notion of recycling, provided in Fig. 6(b). The choice of this particular sign deserves a brief explanation. As already mentioned, almost all Linux-based operating systems are released under open licenses. Such software is free of charge and may be legally modified and reused by anyone. Most of Ubuntu derivatives, although released under open licenses, include components which may not be modified and therefore, strictly speaking, are not entirely open. Gobuntu, on the other hand, does not contain this type of components – all pieces of software are fully modifiable. According to the creators of the distribution, this "openness" is highlighted in the logo, as "the three arrows have a 'recycle' theme which describes the sharing and reuse of genuinely free software." (https://wiki.ubuntu.com/gobuntu_logo)

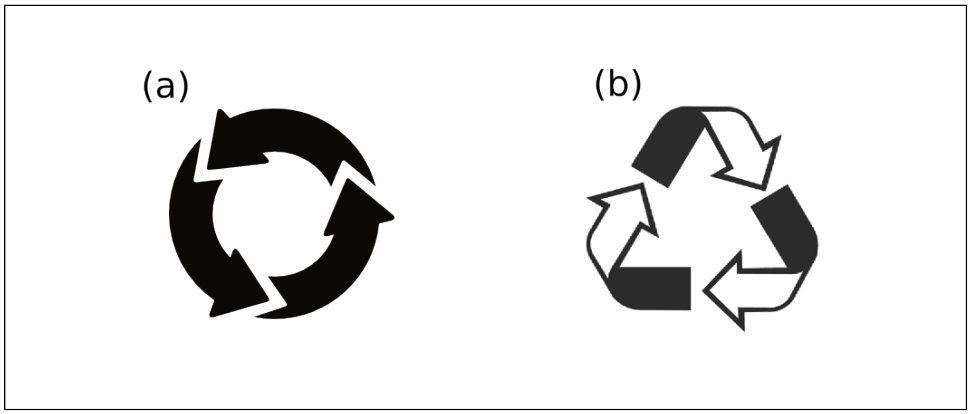

Figure 6. (a) Gobuntu logo; (b) recycling sign.

Let us now have a closer look at the content of mental spaces involved in the process of blending. Two inputs contain the Ubuntu logo and the recycling sign. Abstraction of the generic space structure is not problematic – it is a closed regular shape consisting of three equal, clearly distinguished sections. Exact shape

of the figure is not specified in the generic space, but in the blend it is recruited from the Ubuntu space, while other details (arrows and lack of small circles at the edges) are contributed by the recycling space. Interestingly, in this case the color is not derived from any input and does not seem to play any significant role in the blend. Despite the fact that in Fig. 6(b) the sign is of the same color as Gobuntu logo, this similarity is incidental, because the recycling sign is not necessarily black. In fact, instances of this sign can have any color, green being perhaps most popular due associations with nature. The fact that color does not come from any input space may appear to be meaningless and, consequently, may be seen as violation of the optimality principle of good reason, but in fact the color is motivated indirectly. In previous logos the color of the blend highlights not only relationship with the desktop environment of graphic theme, but also the difference between the derivative and the original Ubuntu. Thus, Kubuntu and Xubuntu logos are blue not only because blue is the dominant color of the desktop environment space, but also because it is *not* the color of Ubuntu logo. In order to perform this function, the color had to be derived from the space other than the Ubuntu space. As the recycling sign does not have any fixed color, no specific color is available from the recycling space. On the other hand, the color still distinguishes Fluxbuntu from Ubuntu simply because it is *different* from the color of Ubuntu logo. In this sense, arbitrarily selected black performs the same function as motivated blue or green.

4 Blending and names

So far we have used conceptual blending to explain the formation of graphic signs. Logos, however, are only one element of "semiotic wrapping" of Ubuntu derivatives. In this section we will focus on linguistic signs used to denote particular distributions. It is perhaps not surprising that names of Ubuntu derivatives perform function similar to the one of logos – they underline common origin of all derivatives, but at the same time they point to salient differences between them. Perhaps even less surprising is the fact that the process governing the creation of novel names is once again conceptual blending.

Blending does not apply to the word *Ubuntu* [6] for the very same reasons it did not apply to Ubuntu logo – this distribution is the base for derivatives and its name does not have to encode any additional features distinguishing it from anything else. Instead, it is Ubuntu that other distributions need to be distinguished from. Once again we will begin with Kubuntu, whose name is probably the most straightforward case. *Kubuntu* is a combination of the *Ubuntu* and prefix *K*. A significant feature of almost all names of applications included in KDE desktop environment share certain morphological idiosyncrasy – they include letter *K*, e.g.:

(2) *Konqueror* (web browser)
(3) *KMail* (e-mail client)
(4) *KOffice* (office suite)
(5) *Kaffeine* (video player)

[6] In this section the words written in italics refer to the signifiers, i.e. spoken or written representations. Words enclosed with single quotation marks refer to meanings, i.e. semantic structures.

(6) *Amarok* (audio player)
(7) *KPDF* (PDF reader)
(8) *DigiKam* (video camera utility)

Whenever possible, the letter is integrated phonologically and orthographically into the word (sometimes against orthographic conventions of English), like in (2) and (5). Sometimes the letter appears in the middle, like in (8), the typical position, however, is the beginning of the word, like in (2), (3) and (4). Thus, letter *K* may be treated as "morpheme"[7] signaling relatedness of a particular piece of software with KDE.[8] However, the process of creating a novel name cannot be viewed as sheer affixation. Unlike typical affixes, the morpheme is quite unstable in terms of phonological and orthographic integration and distribution. Although *K* tends to be a prefix characterized by low degree of phonological and orthographic integration with the stem, like in (3), (4) and (7), it behaves rather opportunistically whenever closer integration is possible, like in (2), (5), (6) and (8). In other words, whenever the stem includes a grapheme *c* or *k* (equivalent to phoneme [k]), the *K* morpheme overrides the grapheme, usually at the expense of orthographic conventions of English. This suggests that the morpheme is used dynamically and its actual realization is not always predictable on the basis of rigid rules. Morphological peculiarities of this element are handled in a more satisfactory way by a dynamic process of conceptual blending.

Let us return to *Kubuntu* and accept a slightly oversimplified statement that one of the input spaces contains the word *Ubuntu*.[9] The other input includes morpheme *K* and specific words instantiating morphological patterns in which it occurs. We must realize that it is not sufficient to provide the morpheme alone – it should be accompanied with "instruction" determining use in specific contexts. For typical morphemes, this includes information about the distribution of the element (word initial, word final, word central, etc.). This, however, is not possible for morpheme *K*, as it is used more unpredictably and opportunistically. We must, therefore, accept that the "rules" are rather flexible and the actual realization is heavily dependent on additional factors.

The content of the generic space is a schematic structure of a word. This structure also determines the manner in which *K* combines with *Ubuntu*. Out of many morphological patterns instantiated in words in the KDE input (e.g. word initial *K* with no orthographic integration, word final *K* with integration, etc.) one pattern is selected, which is perceived as the most suitable for the stem *Ubuntu*. For instance, the pattern of well integrated word initial *K*, like in *Kaffeine*, is immediately rejected as in this word *K* is superimposed on an existing grapheme; for

[7] Technically speaking, K a real morpheme. The most important difference is the fact that real morphemes have fixed location within the word. In this case I use the term "morpheme" to refer to a meaningful particle that functions on the level of morphology.

[8] Notice that K is also a part of the KDE logo.

[9] At this point a question arises whether "word" stands for a phonological representation (actual cluster of sounds), written representation (actual group of graphemes) or a more abstract concept of a word (semantic structure). Although I believe that the last option is the best, answering this question falls outside the scope of this article and is not extremely relevant for our discussion. For the sake of simplicity, I will, somewhat arbitrarily, focus on written representations and ignore phonological nuances whenever possible.

Ubuntu, having no initial letter *k* or *c*, this option is not available. Eventually, the structure of the generic space is a pattern of a word containing no grapheme *k* or *c*, which applies both to *Ubuntu* and one of the words from the KDE space – the one found in, for instance, *KOffice*. In the KDE space words of this structure have the morpheme attached word initially. Thus, the content of the Ubuntu space facilitates the selection of appropriate morphological schema from the KDE input. The schema, in turn, is mapped into the blended space and governs the formation of the emergent structure – novel word involves morpheme *K* attached word initially to *Ubuntu*.

Kubuntu provided a useful scheme of name formation for future derivatives. Roughly speaking, the schema consists in attaching a prefix to *Ubuntu*, which functions as a morphological stem. Consequently, when Xubuntu was released, prefixation was already a preferred way of creating novel names. In terms of conceptual blending this pattern can be accounted for by means of proposing an auxiliary space embracing an abstract schema characterizing the morphological structure of *Kubuntu*. Thus, in the case of *Xubuntu* conceptual blending involves three input spaces: one of them contains word *Ubuntu,* another includes the already mentioned auxiliary schema and the last one is related with XFCE. Ideally, the XFCE space should contribute a prefix-like component, but this time the situation is slightly more complicated – there are no obvious candidates for this element. Certainly, the input contains a awkward cluster *XFCE*. However, unlike for KDE, there are rather few programs developed specifically for this desktop environment and the ones that are do not always mark relatedness with XFCE overtly. One example is Thunar, an XFCE file manager, whose belonging to this particular desktop environment cannot be deduced on the basis of the name. Other names do provide cues about XFCE, but they do it in various mutually incompatible ways. For example, a simple text editor for XFCE is Mousepad, its name alluding to the image of a mouse in the logo, but an application for writing data to DVD discs is Xfburn, which makes use of an arbitrarily chosen cluster *xf* from *XFCE*. However, *Xubuntu* does not choose any of these options; instead it selects the particle *x* used as a prefix. This strange choice can be accounted for by means of the contribution of the auxiliary space. In this blend, the auxiliary input provides not only a general morphological pattern of word formation (i.e. prefixation), but it also influences the internal structure of the prefix. To put it simply, the novel prefix is formed to resemble as closely as possible prefix *K*, i.e. a short, preferably one letter, element. In this way, morpheme *mouse*, used by *Mousepad*, is eliminated as too long. A better choice turns out to be a shorter cluster *xf*, but its internal structure is still too complex. Improved compatibility is achieved through clipping *xf* into *x*; hence *x* becomes the preferred prefix

Let us summarize the discussion on *Xubuntu*. The blending involves five spaces. Three of them are input spaces including Ubuntu input (with word *Ubuntu*), XFCE input (with word *XFCE*, *Mousepad*, *Xfburn*, *Thunar*, etc.) and an auxiliary input (with word *Kubuntu* determining certain pattern of word formation and internal structure of the prefix). There is a partial correspondence between morpheme *K* in auxiliary space and particle *xf* in XFCE space, which selects this particle from among other candidates. The generic space embraces a morphological pattern specifying little more than the notion of a component of a word being available

for prefixation (this is probably the only property that can be safely claimed to be shared by all three inputs). The blended space contains a novel word *Xubuntu* composed of *Ubuntu* and *x-*, a prefix from XFCE input modified by the auxiliary pattern. The morphological process is guided by the pattern recruited from the auxiliary space. As we can see, the relations between particular spaces may become quite complex, especially when more than two input spaces are involved.

Fluxbuntu is much less complicated, although not less interesting. In the instances analyzed so far, both signs (the word and the logo) constituted a composition of Ubuntu component and a desktop environment component. However, the logo of Fluxbuntu is a combination of the circle of three and and graphic theme used in the derivative, while name follows the suite of *Kubuntu* and *Xubuntu*, selecting the desktop environment (i.e. Fluxbox) for one of the input spaces. We can only hypothesize about the reason for this discrepancy. The most plausible explanation seems to be the contribution of the third space containing *Kubuntu* (just like in the case of *Xubuntu*). By the time Fluxbuntu was released, the morphological schema of prefixation, started by *Kubuntu* and reinforced by *Xubuntu* had already become quite productive if not, to some extent, conventionalized.

In many respects the emergence of *Fluxbuntu*, follows the general pattern of the already discussed sign formation: there are three input spaces altogether, one of them is the Ubuntu space, another is Fluxbox space, the last is the auxiliary space with *Kubuntu*. In the second space *Fluxbox* is divided along the morpheme boundary into particles *flux* and *box*. The auxiliary space forces the prefixation for the preferred morphological process of word formation and the principle of topology selects *flux* rather than *box*, as the former appears word initially, in a prefix-like position in the input word. The generic space includes the notion of a morphological element available for prefixation. It is worth noticing that *Fluxbuntu* displays certain morphological peculiarity. The initial letter of Ubuntu is clipped, which in principle violates the pattern of prefixation provided by *Kubuntu* – the stem *Ubuntu* typically remains unaltered. Explanation of this peculiarity is provided by the internal morphological structure of *Fluxbox*, where the particle *flux* is immediately followed by *b*. As *b* is also one of initial letters of *Ubuntu*, the sequence *fluxb* from *Fluxbox* can be easily integrated into the blend at the expense of the initial letter. This phenomenon is not incidental (otherwise it would violate the principle of good reason), as, effectively, it amounts to strengthening the relation with *Fluxbox* – the import from this space is not only the morpheme *flux*, but also the manner of integrating it with the stem through *xb* cluster .

The last distribution covered in this article is Gobuntu. The motivation behind this name is far more hazy than in the case of previously analyzed Ubuntu derivatives. Similarly to Gobuntu logo, the name does not evoke any inherent part of the software (like the desktop environment); instead it contains reference to "philosophy" of developing and using open source applications. An important fact is that in *Gobuntu* particle *go* is sometimes written in green and *buntu* in black; this choice of colors is explained on one of Ubuntu websites (https://wiki.ubuntu.com/gobuntu_logo derived), where the authors write that "green in 'go' has an 'environmentally friendly' aspect, as well as reminding one of the green light in a traffic light, the common phrase that 'green means go'." In other words, *go* is to be associated with the permission to reuse and modify all compo-

nents of the truly open operating system. Here, the network of mapping is somewhat more sophisticated, as *go* is associated with the notion of 'permissiveness' through the color of the letters in the enhanced graphical rendering of the name.

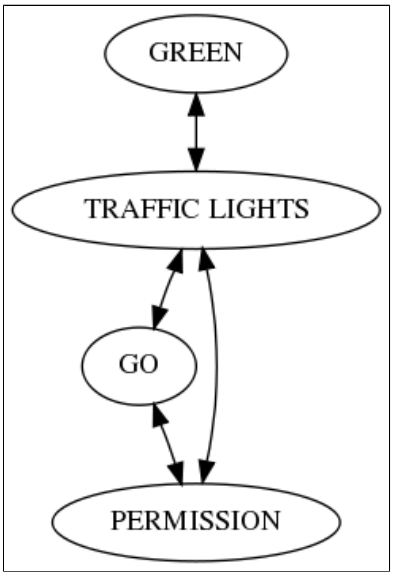

Figure 7.

Hence, apart from the Ubuntu input space the process of blending involves a broad space of permissiveness. This space includes a set various notions ('go', 'green', 'green means go', 'traffic light', 'permission', etc.). In some cases, the notion are semantically distant (e.g. 'go' and 'green'), but they are related via a system of metonymic connections sketched in Fig. 7. As evident from the diagram, green *go* in *Gobuntu*, is to trigger a chain of associations 'green' → '(green) traffic light' → 'go' → 'permission'.[10] In this way both green and *go* are metonymically linked with the notion of 'permission'. This semantic connection is exploited in the blended space – *go* is mapped into the blended space as an element metonymically associated with permissiveness (in graphically rich inscriptions, green strengthens this associations). The morphological pattern of prefixation is once again provided by auxiliary Kubuntu space. Similarly to Fluxbuntu, initial *u* of *Ubuntu* is dropped in the blend, but this time the reason is purely phonological – combination *ou* on the morpheme boundary leads to vowel hiatus and is rather awkward in English. In this case *u*-deletion should be treated as a mere phonological simplification rather than a meaningful contribution to the emergent structure.

This blend, however, is somewhat less optimal than the ones analyzed so far. One reason for this is the fact that it violates the optimality principle of unpacking

[10] In fact, both the network of the input space as shown in Fig. 7 and the chain of association presented in the text is more complex. In the space, the mappings are not perfectly symmetric, as suggested by two directional arrows, and in the chain the associations they are not perfectly unidirectional (for more extensive discussion on metonymy see Radden & Kövecses 1999). Moreover, as evident from the diagram, TRAFFIC LIGHTS is linked to PERMISSION not only through GO, but there is a direct metonymic connection between them.

– dense metonymic network in the permissiveness input space makes it virtually impossible to reconstruct connections between particular elements on the basis of the blend alone. As a result, the motivation behind particular components is quite obscure and the blend is not entirely transparent. Nevertheless, this does not make *Gobuntu* inadequate in any way; it simply means that the link between the signifier and the signified depends more heavily on convention rather than easily recognizable contributions from input spaces.

5 Restrictions on creativity

Conceptual blending, being a highly creative and dynamic process, opens many potential ways for combining seemingly dissimilar elements. So far we have focused on how various structures can be dynamically blended into one coherent sign. The questions that arises at this point is whether this creativity is unlimited, allowing for arbitrary composition of arbitrary elements, or is it restricted by some rules which limit the number of possible blends. If the latter is the case, what are these rules?

The notion of a rule requires a brief discussion. Rules are often thought of as strict, deterministic and inflexible laws, stipulating what *must* be done or what *must not* be done (or both). Within the field of linguistics, such understanding of rules is typical of the transformational-generative paradigm started by Noam Chomsky and virtually all structuralist schools. In cognitive linguistics, on the other hand, rules are conceived as **constructional schemas**, which embody articulatory routines and habits of speakers rather than abstract laws. Schemas, are less deterministic and prone to influences of other factors. Moreover, constructional schemas usually form a network and vividly interact with each other in the process of articulation. As a result, selection of particular schema is not a matter of applying fixed rules, but a result of a dynamic and not entirely predictable process. Schemas specify what *should* and what *is typically* done in order to achieve desirable communicative purpose, but violation of the schema does not always result in breakdown of communication.

In conceptual blending the source of restrictions are optimality principles, which function similarly to the constructional schemas. As we remember, optimality principles are not strict laws governing the process, but general "guidelines" which should be followed if the blend is to be understandable and cognitively economical. Most probably no single blend fully obeys all of principles; nevertheless, it can be safely assumed that more optimal blends (i.e. the blends that satisfy more optimality principles to greater degree) are preferred over less optimal ones. In the case of Ubuntu logos it is useful to propose two additional principles, which I will call **the optimality principle of balance** and **the principle of type**. According to the former, the contribution from the two main input spaces (typically the Ubuntu space and the desktop environment space) should be as equal as possible, so that the elements from one input space do not dominate the elements from the other. This principle is motivated by the chief function performed by a novel Ubuntu logo and names – on the one hand, the sign is to express, more or less equally, the fact of relatedness of a distribution to the Ubuntu family and point to a feature distinguishing it from the other members

of this family. If this function is to be fulfilled successfully, elements from one input cannot become excessively salient, due to the risk of backgrounding the contribution from the other space. According to the principle of type, whenever possible, the blend should not mix structures of different types, i.e. non-linguistic graphic structures in logos should not be combined with linguistic elements and linguistic elements in names should not involve reference to non-linguistic elements.

Let us now have a look at how these principles work in practice. Kubuntu logo (Fig. 3(a)) combines the circle of three from the Ubuntu logo with the motif of a gear – the shape of the gear is superimposed on three small circle on the perimeter of the circle of three. This configuration reflects the principle of topology, since the overall shape of the small circles is similar to the overall shape of the gear. In principle, it is also possible to superimpose the gear motif on the whole circle of three, so that the logo features one big gear; in this case the principle of topology would be fulfilled equally well. Such a blend, however, would be much less optimal, as it would violate the principle of balance – there is a danger that an image of a big gear would produce very strong association with KDE and consequently dominate the Ubuntu component.

A similar situation is possible in the case of Xubuntu logo (Fig. 4). This blend involves the circle of three and the image of a mouse inside this circle. Another possible version of this sign would have the three images of a mouse replacing small circle on the perimeter and the inside of the circle empty. This, nevertheless, is also less optimal than the actual logo. The original sign follows the principle of topology, as here the mouse is placed in the same spatial configuration as in the XFCE logo; the alternative version would violate this principle and would not improve compliance with any other principle. Another version of Xubuntu logo could involve the combination of letters XFCE placed inside the circle of three instead of the mouse. This, however, would be at odds with the principles of type and topology (letters in XFCE logo are not in the center of the sign, but they would be in such position in the alternative Xubuntu logo). This principle also explains why the name of Xubuntu is not *Mousebuntu*; potentially this path was open for the authors of this distribution, since the image of a mouse is very characteristic of XFCE (definitely more characteristic than morpheme *X*, which in the world of Linux operating systems tends to be associated with other types of software). *Mouse-* in *Mousebuntu*, would refer to non-linguistic graphic elements of the desktop environment, which, according to the principle of type, should not be expressed in linguistic signs.

The optimality principle of balance accounts for the fact that in all examples the color of the blended sign is not inherited from the Ubuntu input space. Since in all examples this space contributes a very salient motif of the circle of three, the color is derived from the other space in order to strengthen the connection with this space. For the already discussed reasons, the principle is operative even in the case of the seemingly unmotivated color of Gobuntu logo. Hence, the outcome of conceptual blending is the result of tension between dynamic creativity and the restrictions imposed by the principles of optimality. The choice of a particular blend out of many potentially possible structures is not random; instead, the most

optimal blends (as specified by the principles of optimality) are favored over less optimal ones.

6 Beyond Ubuntu logos

Logos of Ubuntu derivatives are a perfect illustration of how conceptual blending can systematically organize the process of sign formation within a group of related signs. Despite the fact that there are no fixed rules determining precisely how two signs should be blended and in each case the details of the process are dependent on characteristics of the input signs, combining components of the default Ubuntu logo with other graphic structures has become a standard manner of creating logos of derivative distributions. However, conceptual blending is not restricted to the sign formation within this narrow group. In fact, this cognitive process accounts for a number various visual signs.

One of the best known examples is the Union Jack – the flag of the United Kingdom (Fig. 8). This sign is a combination of three other signs: the flags of England, Scotland and Ireland (with an additional "transitional" flag from the seventeenth century). In this case the motif of a cross present shared by all flags is mapped without fusion into the blend and contribution of colors mapped faithfully from the inputs reinforces the resemblance to each of the flags. The sign is to symbolize the close union of England, Scotland and Ireland, in which the three countries retain much of their national characteristics.

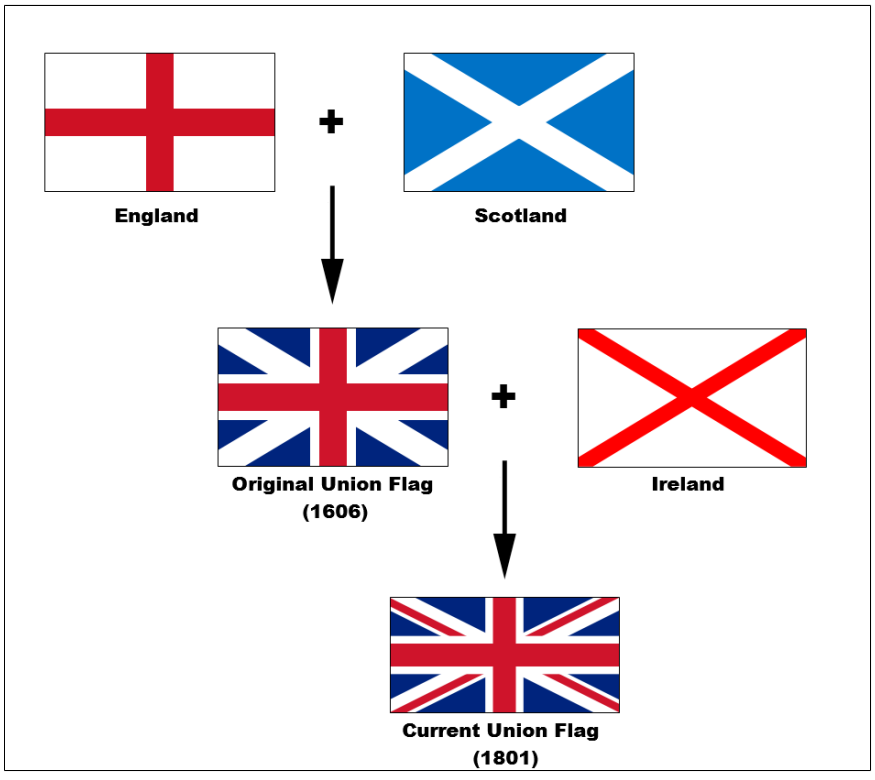

Figure 8.

Another "vexillological" example of the flag of National Bolsheviks, a extremist political movement that claims to combine the ideology of radical nationalism and Bolshevism. Both elements are expressed semiotically in the national Bolshevik flag presented in Fig. 9(a), an obvious blend of the Nazi flag (Fig. (b)) and the motif of the hammer and sickle associated with the communist movement (Fig. (c)). In this case, the distinctive element of the hammer and sickle is mapped into the region originally occupied by the swastika, but the color is derived from the Nazi flag space to strengthen the semantic link with the radical nationalist emblem.

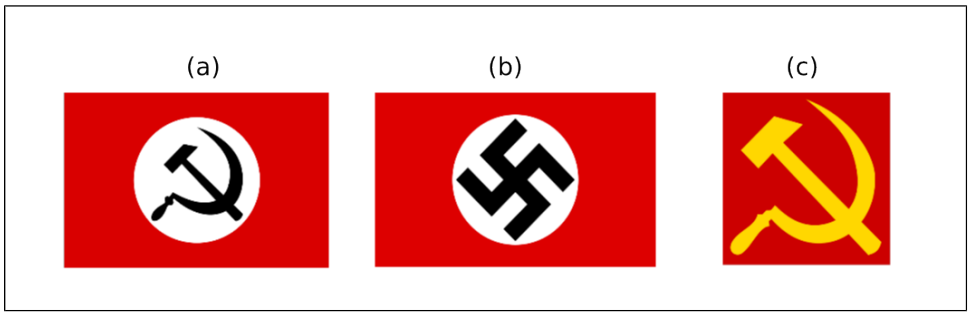

Figure 9.

Blends of graphic signs are sometimes used to highlight alleged or fictional connections between institutions or to criticize a policy of a company. Figure 10(a) demonstrates a fictional logo of what could be a space agency established or sponsored by IT corporations. This sign blends two well known logos – one of them is the National Aeronautics and Space Administration (NASA; Fig. (b)), while the other is one of the biggest IT companies, Apple Inc. (Fig. (c)). Here, only the overall shape of an apple is mapped from the Apple Inc. input space, whereas other details are provided by the NASA input, however, the apple shape is so distinctive that it constitutes a sufficient connection with the Apple Inc. space.

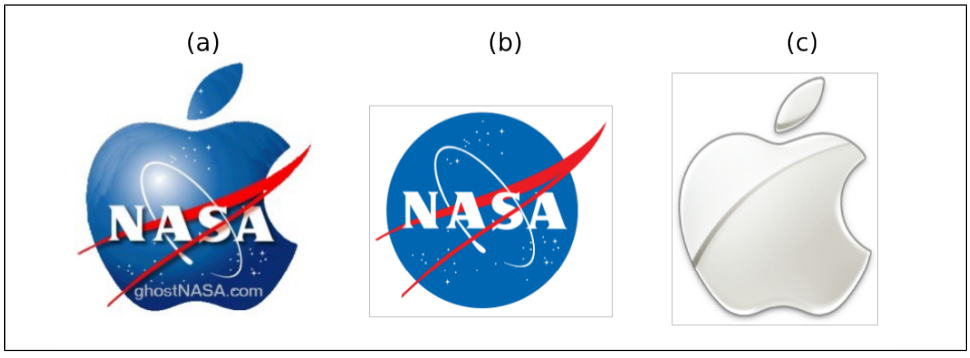

Figure 10.

Figure 11(a) in turn features a humorous blend of the Eastern States Standard Oil (also known as Esso), whose logo is presented in Fig. (b). This blend exploits the similarity between letter S and the dollar symbol, as a result of which the symbol is mapped into the Esso logo. This combination seems to suggest the excessive preoccupation with money on the part of the company.

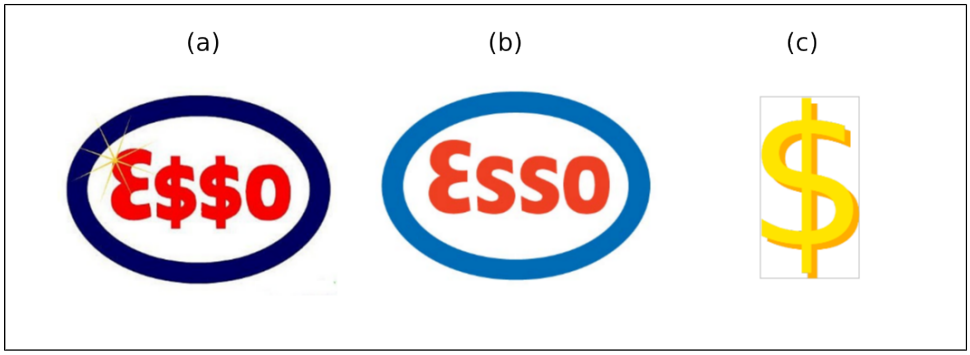

Figure 11.

Blends are of logos are often used for purely humorous purposes. The final example brings us back to the field of information technology. The sign is a logo of a fictional operating system Macintosh Windows (Fig. 12(a)), a hybrid of Microsoft Windows (its logo is shown in the Fig. 12(b)) and Macintosh's Mac X OS operating systems (produced by Apple Inc.; its logo is presented in Fig. 10(c)). It is worth mentioning that in this case, the name of the fictional system is a result of blending as well. The comic effect is evident if we bear in mind that Microsoft and Macintosh are the main rivals in the market of computer operating systems and it is virtually impossible for them to cooperate in order to release a such a hybrid piece of software.

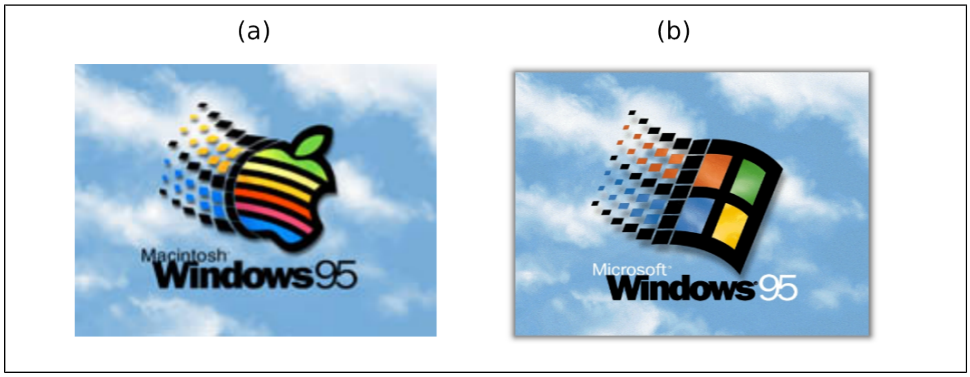

Figure 12.

In spite of the fact that the blending theory is most widely used in the field of linguistics, the process is cognitive rather than linguistic in nature. The above example prove that elements of graphic signs may be successfully blended and used for a variety of purposes. More importantly, the exemplar of Ubuntu derivatives shows that in some cases conceptual blending can be used persistently and systematically for certain array of signs.

7 Conclusion

Logos and names of many Ubuntu derivatives are formed in roughly the same way. Although the kind of input used for each type of sign is different (graphic structures vs. morphemes), the basic mechanisms responsible for blending of the

material are very similar. In both cases the sign is a composition of elements from Ubuntu space (morpheme *Ubuntu* vs. the circle of three) and element related with distinctive features of each distribution (morphemes vs. graphic structures associated with desktop environment, graphic theme, etc.). Regardless of the type of the material, similarities are sought across available structures; these similarities are used later as a basis for constructional operations of blending existing elements into novel semiotic structures. New signs are tightly knit and coherent units, which inherit recognizable components from original signs and are usually semantically transparent.

The analysis proposed in this article is by no means exhaustive. Intimately related with the points discussed above is the question of motivation, i.e. the non-arbitrariness of signifier-signified link. This matter was only touched upon in several places, where it was relevant for the discussion, but it definitely deserves a more complete treatment. Another issue that did not receive sufficient attention is the question of medium (speech vs. writing) and its impact on word formation (one example of such influence is *u*-deletion in *Gobuntu*). Also the distributions selected for the analysis are just several instances of all existing Ubuntu derivatives. However, in my opinion, the examples are adequate illustrations of various phenomena in the process of conceptual blending and convincingly demonstrate similarities in the formation of linguistic and non-linguistic signs.

As we have seen, creation of new signs is a dynamic process. Conceptual blending cannot *predict* its ultimate outcome, but it is able to *describe* it in a fairly detailed manner. This should not be considered as a shortcoming of the theoretical framework, as probably there are no fixed, deterministic and universal rules governing formation of novel sign (especially non-linguistic ones, like logos). In many cases the process is highly creative and utilizes opportunistically many types of seemingly unrelated structures (e.g. the circle of three and an image of a mouse in Xubuntu logo). The theory of conceptual blending provides a convenient descriptive model, which allows us to define general principles structuring this dynamic and seemingly chaotic conceptual operations (optimality principles). Another strength of conceptual blending is that it is able to systematically account for apparently incidental or arbitrary phenomena (e.g. *u*-deletion in *Fluxbuntu*).

At the same time, this powerful descriptive tool does not employ highly sophisticated and abstract apparatus. In spite of the fact that actual realizations of the process may be quite complex, conceptual blending is founded on fairly basic cognitive capabilities of human mind – ability to perceive similarities and extract patterns embodying them, establishing correspondences between entities, combining conceptual structures, etc. (cf. e.g., Langacker 1982). These capabilities are not restricted to the processing of one type of data; consequently, conceptual blending may be applied successfully to the analysis of many types of data.

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C. S. Peirce's Definition of Symbol in §14 of the *New List* [1]

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Abstract

The main body of this paper consists of a commentary on §14 of Peirce's 1867 paper "On a New List of Categories," in which Peirce derives the concept of Symbol within his general theory of representations. Rather than aiming at a comprehensive study of the *New List*, the paper closely observes how Peirce arrives at his definition of Symbol in the *New List* by elucidating its main ideas. The paper suggests that Symbol occupies a unique conceptual locus in Peirce's theory of categories and that his definition of Symbol in the *New List* is consistent with Peirce's later formulations of Symbol. The paper includes five brief case studies of Peirce's formulations of Symbol over the years 1866 - c.1911.

1 Introduction

On 14 May 1867, C. S. Peirce presented a brief article entitled "On a New List of Categories" to the American Academy of Arts and Sciences, which was published in its *Proceedings* in the following year. In §14 of this article, Peirce demonstrated how signs could be classified into Icon, Index, and Symbol. The article — hereafter abbreviated as the *New List* — remained a significant achievement for Peirce. The "gift I make to the world," he wrote around the time of its composition, continuing: "In it I shall live when oblivion has me — my body" (W 2: 1, 1867). Twenty-eight years later, Peirce famously commented that the article was "perhaps the least unsatisfactory" paper he ever produced from a "logical point of view"(CP 2.340, c.1895). After more than forty years, Peirce still perceived "the substance of my central achievement" to be focused in the *New List* (MS L 387b: 327, 1908). These, together with other similar remarks, indicate that the *New List* had fundamental significance for Peirce.

There are, however, much debated mysteries about the *New List* as well. The *New List* is not only an important paper but exhibits obscurity in a number of ways. Thus Murray Murphey writes: "Certainly of all Peirce's published papers there is none which is so cryptic in its statement of essentials, so ambiguous in its definition of terms, so obscure in its formulation of the central doctrine, or so important in its content."[2] The obscurity, not incidentally, extends to the definition of Symbol in the *New List*, which is on my reading this: A Symbol is a sign

[1] In writing this paper I owe particular thanks to David Agler and Daniel Brunson for their detailed comments and suggestions; to Tom Short for his critical reading of a previous draft; to Doug Anderson for sustained encouragement; and to several other readers, including the peer reviewers of this journal, whose suggestions I have found very helpful.

[2] Murphey, *The Development of Peirce's Philosophy*, p.66.

whose quality is imputed to its object. As readers of Peirce may notice, however, this definition of Symbol sounds very different from the many formulations of Symbol Peirce offers in his later writings. It would then be natural for us to wonder whether Peirce's definition of Symbol in the *New List* produces a coherent echo with the many subsequent formulations of Symbol he offers.

My own view on this last matter is that the definition of Symbol in the *New List* is remarkably consistent with most of what Peirce says about Symbol in later years, hence in part explaining Peirce's high evaluation of the *New List*. It would be, however, premature to make such a judgment at this point. For it is necessary to analyze and understand how Peirce arrived at his definition of Symbol in the *New List* before developing a much broader opinion. In what follows, my primary aim is to reconstruct Peirce's derivation of Symbol in the *New List* in some detail. More specifically, I will focus on §14 of the *New List*, in which Peirce draws the conclusion that there are three kinds of representations, of which the last, the third, is Symbol.

I assume that readers have some idea of what 'sign,' 'icon,' 'index,' and 'interpretant' mean for Peirce, although I will very closely follow the derivation of Index as well. We shall not attempt to do justice to the *New List* in its entirety. [3] Instead, the paper concentrates upon the central ideas that lead to the derivation of Symbol in the *New List*. Once this is done, an independent section will be devoted to five brief case studies of well-known formulations of Symbol given by Peirce, which range from 1866 to c.1911. The texts considered there are of course highly selective, but enable us to observe how the idea of Symbol in the *New List* could survive in the later semeiotics of Peirce.

The argument of §14 of the *New List* is extremely dense. It is, therefore, helpful to note in advance that Peirce's argument consists of two steps. First, Peirce will differentiate Index from Icon. Second, he will differentiate Symbol from Icon and Index. With this in view, in sections **2** and **3** below, which correspond to these two differentiations, I will present Peirce's text and a series of commentaries on it. The first step is explained by Peirce in fewer than 150 words, the second step in fewer than 90 words. Another complicating issue is that the *New List* was written under the strong influence of the opus magnum *Critique of Pure Reason* (1781) by Immanuel Kant.[4] Minimal information concerning Kant will be provided in **2.2.3**.

Finally, a remark on terminology: For the sake of simplicity, we will not distinguish between 'representation' and 'sign' or between 'likeness' and 'icon' in this paper. In doing so we follow Max Fisch[5] as well as the editors of the *Collected Papers of Charles Sanders Peirce*.[6] Readers who do not specialize in Peirce studies are well advised to take them as synonymous.

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[3] For a more comprehensive analysis of the *New List*, including the genesis of the text, see De Tienne, *L'Analytique de la Représentation chez Peirce: La Genèse de la Théorie des Catégories* (1996).

[4] Peirce later writes: "My own list grew originally out of the study of the table of Kant"(CP 1.300, c.1894).

[5] Fisch, *Peirce, Semeiotic, and Pragmatism: Essays by Max H. Fisch*, p.324.

[6] See the editorial notes on p. 295 of the *Collected Papers*, volume 1.

2 The Derivation of Index

2.1 Peirce's Text

The first step of the argument occupies roughly two thirds of §14. The theoretical consideration is done in just one sentence, from which Peirce proceeds to declare that there are two kinds of 'relation.' The last two paragraphs are additional explanations which I will return to in **2.2.6**. Here is the text that differentiates Index from Icon (W 2: 55.20-34, CP 1.558):

> §14. A quality may have a special determination which prevents its being prescinded from reference to a correlate. Hence there are two kinds of relation.
>
> 1st. That of relates whose reference to a ground is a prescindible or internal quality.
>
> 2d. That of relates whose reference to a ground is an unprescindible or relative quality.
>
> In the former case [the '1st'], the relation is a mere *concurrence* of the correlates in one character, and [therefore] the relate and correlate are not [sharply] distinguished. In the latter case [the '2d'] the correlate is set over against the relate, and there is in some sense an *opposition*.
>
> Relates of the first kind are brought into relation simply by their agreement. But mere disagreement (unrecognized) does not constitute relation, and therefore relates of the second kind are only brought into relation by correspondence in fact.

2.2 Commentary

2.2.1 Keywords in the First Two Sentences

The above in **2.1** is the entire text that purports to show that there are, to this point, exactly two kinds of representations, or signs, which will be termed Likeness or Icon, and Index. Once again, the first two sentences from §14 read:

> A quality may have a special determination which prevents its being prescinded from reference to a correlate. Hence there are two kinds of relation.

Note that the first sentence is the only theoretical explanation Peirce offers. In order to decipher these two sentences, I will explicate what Peirce means by **Quality**, **Correlate**, **Relation**, and **Prescision** (its verb is *prescind*). These are fundamental ideas that cannot be skipped. The concepts underlie both Peirce's differentiation of Index from Icon, and Symbol from Icon and Index.

2.2.2 Quality

A quality in the *New List* refers to a determination of an underlying substance that we are conscious of in a proposition. An example Peirce gives in the *New List* is the proposition, "This stove is black." The predicative part 'is black' is the **Quality**. The abstract blackness considered in itself is called a 'ground' by Peirce. 'This stove' refers to the underlying substance that the proposition describes as being black. Thus the latter, substance, is predicated of by the former, the **Quality**, which results in a formation of a proposition.

2.2.3 Correlate

In a proposition some property is ascribed to an object. More importantly, it is through the formation of a proposition that we become aware of what we were thinking about a given object. That is, I form for instance the proposition "This stove is black" in my thought, and *then* I can say that I am definitely grasping what I was thinking about the perceived object.

Peirce's *New List* develops an analysis of this process of proposition-formation. It aims at analyzing the ordered structure of the successive phases of cognition that results in the formation of a proposition. In this context, **Correlate** refers to each phase of an object that appears in the stream of that formation. Although Peirce uses the term **Correlate** in much a wider sense than Kant does, a helpful analogue of the idea can be found in Kant's *Critique of Pure Reason*. Kant writes (p.225 [A198-199/B244]):

> The situation, then, is this: there is an order in our representations in which the present [stage of cognition], so far as it has come to be, refers us to some preceding state [preceding cognition] as a correlate [Korrelatum] of the event which is given; and though this correlate is, indeed indeterminate, it none the less stands in a determining relation to the [present] event as its consequence, connecting the event in necessary relation with itself in the time-series.

Kant is saying many things here, but we shall confine our attention to just three points. First, a **Correlate** is at the preceding stage of cognition if seen from the perspective of the present. Second, determination increases as we move along the time-series. Third, the succession is not arbitrary: It has a logical structure, a determining relation, involved. These lead to the view that thought becomes structured as well as determinate when a judgment is formed (Kant's view) or when a proposition is formed (Peirce's view). This is the base line.

Every stage of thought thus has a preceding stage. The phase of an object appearing at each stage, however indeterminate, is called a **Correlate** by Peirce in this context. Therefore, a **Correlate**, if you please, refers to each of the many transitional 'snap-shots' of an object that will eventually be described in the proposition as having such and such a quality. This is why in the *New List* Peirce warns us that the objects indicated by the subject term of a proposition is to be seen as *always* potentially *plural* (W 2: 57.33-58.3, CP 1.559):

> The objects indicated by the subject (which are always potentially a plurality,— at least, of phases or appearances) are therefore stated by the proposition to be related to one another on the ground of the character indicated by the predicate.

The phrase 'related to one another on the ground of ...' indicates the *logical structure* which would correspond to the "determining relation" mentioned by Kant above. In this manner 'phases' and 'appearances' — note the highly Kantian term 'appearance' — of objects are all **Correlates** for Peirce.

More generally, if *X* represents *Y*, this roughly means, for both Kant and Peirce, that '*Y* is seen through *X*' or equivalently '*X* is a representation of *Y*.' In this more general context, Peirce calls *Y*, namely, that which is seen through the representation, the **Correlate**, whereas *X*, namely, that through which we see the object of representation, is called the 'relate.' Thus if a person reads off the direction

of wind through the motion of a weathercock, the weathercock is the *relate*, the wind is the **Correlate**. I mention this because the use of the term 'relate' in this last sense is found in the text presented in **2.1**. The weathercock example will be discussed again in **2.2.6**.

2.2.4 Prescision

Prescision is a method of differentiation introduced in §5 of the *New List*. Its nearest meaning is *non-reciprocal abstraction*. The method is used to (1) derive Peirce's *categories* (which is why the *New List* is entitled "On a New List of Categories"); and (2) to differentiate Index from Icon, and Symbol from Icon and Index. Obviously, (2) is an application of (1). Hence we need to take a look at (1) before dealing with (2). It is important to note that **Prescision** is the very key to the understanding of the two central derivations in the *New List*. I will, therefore, divide the explanation into three stages: **(i)** I will give an **Overview** of the idea; **(ii)** I will turn to **Peirce's Explanation** and give a **Definition** based upon it; **(iii)** I will consider three **Examples** to flesh out the idea.

(i) Overview of the Idea. I said in the previous section that the *New List* aims at analyzing the ordered structure of the successive phases of cognition that results in the formation of a proposition. The intuitive idea of **Prescision** is to reverse this formation process. That is, **Prescision** is used to determine the logical order in which the indeterminate thought without explicit structure has been shaped into a determinate propositional structure.

The philosophical view on which the method of **Prescision** is conceived by Peirce may require several more lines of explanation. Following Kant, Peirce sees *cognition* as a development of thought in terms of determination and unity. 'Unity,' a word used many times in the *New List*, is borrowed from Kant's famous concept of 'apperception [Apperzeption].' In simplest outline, 'apperception' refers to the synthesis of representations through the forms of intuition and understanding. Categories are forms of the latter, of understanding, that work as *unifiers* of representations. Hence the more the categories are employed, the more the immediate substance is unified, synthesized, and shaped into a more mediated structure of thought. For Peirce the process comes to a temporary arrest with the formation of a proposition, which is the most developed form of unity in this picture.

But how is a proposition formed? In what order are such categories employed? To answer these questions, Peirce works backwards by reversing the formation process. That is, assuming that a proposition is formed in thought, Peirce uses **Prescision** to peel off, one by one, the categories that effected the higher unities. In other words, starting from the surface structure, we want to reveal the deeper conceptual layers that have constructed the object of cognition into what it is. Thus the *first* category we shall discover by **Prescision** would be the *last*, or the shallowest, category that was added to or integrated into the object at the final stage. The *last* category that we shall discover by **Prescision** would be the *first*, or the deepest, category that was applied to the object at the beginning of this pro-

cess.[7] Accordingly, when we have two categories *X* and *Y*, Peirce needs a method to determine which of the two was the deeper or the more immediate category that was integrated into the object prior to the other. **Prescision** is designed to do this work. The idea will become clearer after we give a definition of **Prescision** in **(ii)**, and also after seeing examples in **(iii)** below.

(ii) Peirce's Explanation and Our Definition. Peirce discusses **Prescision** in §5 of the *New List*. Since readers can always go back to the original paper, I will only consider the first two sentences of §5. Peirce's explanation is this (W 2: 50.25-30, CP 1.549):

> §5. The terms "prescision" and "abstraction," which were formerly applied to every kind of separation, are now limited, not merely to mental separation, but to that which arises from *attention to* one element and *neglect of* the other. Exclusive attention consists in a definite conception or *supposition* of one part of an object, without any supposition of the other [part(s) of the same object].

Here is what Peirce is saying. Imagine you see a square object colored red. You form the proposition 'The square thing is red.' But the 'thing' is recognized as such because the conceptions of 'square' and 'red' were attributed to it. Such conceptions play the role of categories. The question is this: 'Square' or 'red' – which was the more immediate category that was applied to the 'thing' first? Read the passage above again. Observing the red square thing, we (a) *attend to* the 'red' color of the thing to the *neglect of* the 'square' shape; (b) we *attend to* the 'square' shape of the thing to the *neglect of* the 'red' color. If (a) is successfully performed while (b) fails, the 'red' is the more mediate or shallower conception, and the 'square' is the more immediate, or deeper, conception that was applied prior to 'red.' Conversely, if (b) is successfully performed while (a) fails, the opposite is the case. If both (a) and (b) fail or obtain *simultaneously*, no conclusion follows. Based upon this, we give the definition of **Prescision** as follows:

> **Definition**
>
> Let *X* and *Y* be categories in the sense just explained.
>
> 1. [Meaning of *Prescision*] If we can *attend to*, or definitely comprehend, *X*, to the *neglect of Y*, we say that *X* can be *prescinded* from *Y*. If *X cannot* be *attended to*, or definitely comprehended, to the *neglect of Y*, we say that *X* cannot be *prescinded* from *Y*.
>
> 2. [Use of *Prescision*] Suppose *X* can be *prescinded* from *Y*, but *Y cannot* be *prescinded* from *X*. Then we judge that *X* is the more mediate category than *Y*, meaning that *Y* is the more immediate category and was employed prior to the employment of *X*.

I know this is confusing. But there is a relatively quick way to keep track of the principle. **Prescision** means non-reciprocal abstraction. Thus successful **Prescision** of *X* from *Y* — and in this direction alone — implies that *X* is more abstract and hence more mediate than *Y*. On the contrary, if *X* cannot be *prescinded* from *Y*, but *Y can* be *prescinded* from *X*, then *X* is the more concrete or immediate category which is nearer to 'substance' in the sense briefly explained in **2.2.2.** A diagram

[7] The adjectives 'deep' and 'shallow' are used for expository purposes. If the spatial metaphors of 'deep' and 'shallow' sound misleading, take 'deep' to mean 'immediate' or 'external,' 'shallow' to mean 'mediate' or 'internal.' The latter adjectives are actually used by Peirce.

would be helpful: If *X can* be prescinded from *Y* but *not* vice versa, *X* is more abstract and mediate, meaning that *Y* lies deeper toward substance in comparison to *X*. See Figure 1 below.[8]

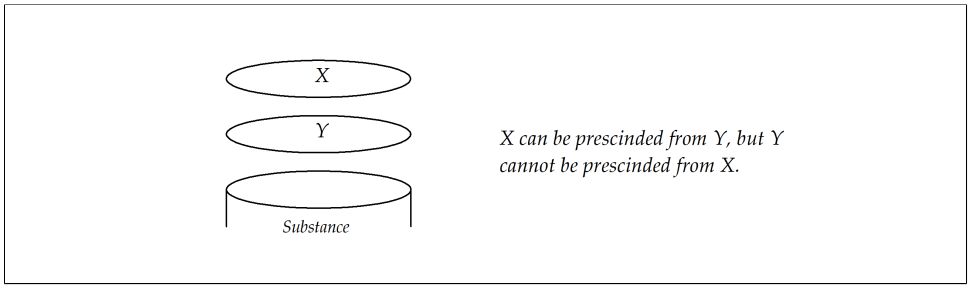

Figure 1. Prescision. Layer *Y* is more immediate or nearer to Substance than layer *X*.

(iii) Examples. Since we are not concerned with the legitimacy of **Prescision** in this paper, I will only consider three examples in order to flesh out the idea a little further. The first example is the **Prescision** of space from color, which Peirce explains in §5 as follows (W 2: 51.1-4, CP 1.549):

> I can prescind red from blue, and space from color (as is manifest from the fact that I actually believe there is an uncolored space between my face and the wall); but I cannot prescind color from space, nor red from color.

Recalling that **Prescision** is useful only when it fails in one direction, we see that the only *full* example Peirce mentions is the **Prescision** of space from color but *not* vice versa. The question returns: 'Space' or 'color,' which is the more mediate category? Thus we start with a colored space. By the *definition* of **Prescision**, we have to do the following: (a) *attend to* the 'space' to the *neglect of* its 'color'; (b) *attend to* the 'color' to the *neglect of* the 'space' it colors. As Peirce explains in the parentheses, it is obvious that (a) can be successfully performed. However, if we start with the colored space and try to *attend to* the color to the *neglect of* the space it colors, the space will have to lose all its dimensions, such that there remains no dimension that the color can cover at all, meaning that (b) fails. Thus space is the more mediate, color the more immediate.

Unfortunately, this is the only full example Peirce explains in the *New List*. But we can think of other examples on our own. Imagine you hear a note from a musical instrument. It is heard with pitch and tone. "A violin has played a B-flat" you might say to yourself. 'Pitch' and 'tone,' which is the more mediate? We can *attend to* the pitch of the note to the *neglect of* tone, since this is what musicians do when they tune the strings. We cannot, however, *attend to* the tone to the *neglect of* pitch, because a tone without pitch is auditorily impossible. Accordingly, pitch is the more mediate, tone the more immediate. This makes natural sense because if we hear a physical sound, such as someone knocking on the door, we can perceive its qualitative tone quite immediately, but even the trained ear of the musician will require a moment of reflection to determine its pitch.

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[8] Figures in this paper are merely auxiliary. They are not meant to replace definitions or verbal explanations in general.

Finally, since Peirce was a scientist as well as a mathematician, consider the equation of a circle with radius *r* centered at the origin of the Euclidean plane. That is, we start with the equation $x^2 + y^2 = r.^2$ We see the structure of the equation, the constant *r*, and the two variables *x* and *y* embedded in the equation. Which is more immediate, the structure of the equation or the two variables? We can *attend to*, or definitely comprehend, the variables *x* and *y* to the *neglect of* the structure of the equation, but we cannot *attend to*, or definitely comprehend, the structure of the equation to the *neglect of* the variables. Thus the structure of the equation is more immediate, the variables more mediate and abstract. This makes natural sense, too, because the variables, taken by themselves, refer to any real number, whereas when embedded in the equation their ranges are restricted and hence particularized to small subsets of the real numbers. When prescinded and liberated from the equation, therefore, they will certainly have greater, abstract generality. Further examples are left to the reader.

2.2.5 Relation

Relation is the second of the three categories Peirce derives in the *New List* by the method of prescision. It is better to have a sense of the overall derivation of the categories, which I referred to as derivation (1) at the very beginning of **2.2.4**. I will first present the 'new list' of categories Peirce arrives at in §11 of the article (W 2: 54.33-39, CP 1.555):

> §11. The five conceptions thus obtained, for reasons which will be sufficiently obvious, may be termed *categories*. That is,
>
> BEING,
>
> Quality (Reference to a Ground),
> **Relation** (**Reference to a Correlate**),
> Representation (Reference to an Interpretant),
>
> SUBSTANCE.

The boldfaces on the line of **Relation** are my emphasis. Note that the 'list' has the form of a sentence, with four commas and a period, indicating that the list is ordered. In the interest of space we will not concern ourselves with the technical terms. But the minimal observation that has to be made is that Quality, **Relation**, and Representation are *defined* by Peirce, respectively, as 'Reference to a Ground,' '**Reference to a Correlate**,' and 'Reference to an Interpretant.' That is, when Peirce uses the phrase 'reference to a correlate,' for instance, we squarely take it to mean **Relation**, and vice versa.

Why is **Relation** located where it is in the list? To start with, the top category BEING and the bottom category SUBSTANCE are located where they are because the whole business is to analyze the process of proposition-formation as explained in **2.2.2** and **2.2.3**. Seen from this angle, BEING and SUBSTANCE are just markers, so to speak, of the two ends of the analysis. That is, BEING is the copula of the proposition, the most mediate of the categories; SUBSTANCE is the material to be structured and organized into a propositional structure, hence considered in itself the most immediate — that's all. Since BEING and SUBSTANCE are only markers, it is appropriate for our purpose to leave them with no further scrutiny.

Next, we only need to look at three sets of sentences taken from the last parts of §7, §8, §9 of the *New List*. Each set is followed by my two-sentence commentary.

(i) Last Sentence of §7 (W 2: 53.4-5, CP 1.551)

> Reference to a ground [Quality] cannot be prescinded from being, but being can be prescinded from it [Quality].

Commentary: By definition, this means that 'being,' which can be successfully prescinded from quality, is the more mediate or abstract. Equivalently, quality is one step more immediate, or deeper, down toward SUBSTANCE than being in the list of categories.

(ii) Last Sentence of §8 (W 2: 53.13-15, CP 1.552)

> Reference to a correlate [**Relation**] cannot be prescinded from reference to a ground [Quality]; but reference to a ground [Quality] may be prescinded from reference to a correlate [**Relation**].

Commentary: By definition, this means that Quality, which can be successfully prescinded from **Relation**, is the more mediate or abstract. Equivalently, **Relation** is one step more immediate, or deeper, down toward SUBSTANCE than Quality in the list of categories.

(iii) Last Sentence of §9 (W 2: 54.14-15, CP 1.553)

> Reference to an interpretant [Representation] cannot be prescinded from reference to a correlate [**Relation**]; but the latter [**Relation**] can be prescinded from the former [Representation].

Commentary: By definition, this means that **Relation**, which can be successfully prescinded from Representation, is the more mediate or abstract. Equivalently, Representation is one step more immediate, or deeper, down toward SUBSTANCE than **Relation** in the list of categories.

What Peirce is doing should now be clear. He is deriving a hierarchy of 'categories' by the method of prescision, which he alludes to as a "gradation" among "conceptions" (W 2: 49.6-7, CP 1.546) at the very beginning of the *New List*. The higher a category sits in the list, the more mediate it is, namely, further away from substance at the bottom, which is nearest to immediate experience. Hence the list is intended to reflect the structure of cognition, which starts from having sense impressions, such as sensing colors, and terminates with the formation of a proposition, such as 'This stove is black.' A modified list of categories is presented in Figure 2. Compare this with Figure 1 and with the first quotation from Peirce in the current section **2.2.5**.

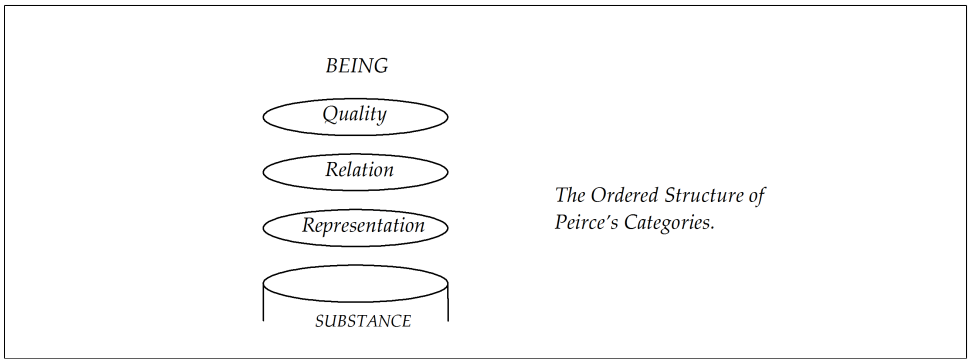

Figure 2. Relation as the Second Derived Category in the *New List*.

As we can see, **Relation** sits below Quality and above Representation. Its nature consists in its reference to a correlate, a phase of some experienced object, but without reference to an interpretant. In short a **Relation** is just the pointing of a quality to a correlate without giving rise to an interpretation. It is *naked pointing*, if you like. Before moving on, it is also useful to observe in Figure 2 that the *deepest* of the three *derived categories* is *Representation*. It reaches into the most immediate or external layer of cognition, and for this reason Peirce says in §10 of the *New List* that representation "unites directly the manifold of substance itself." He then adds: "It is, therefore, the last conception [category] in passing from being to substance"(W 2: 54.30-32, CP 1.554). Observe that this category, derived *last*, is the *first* category applied to substance since it *directly* unites substance. This is how the reversion mentioned in **2.2.4 (i)** operates in the *New List*.

2.2.6 The Text Revisited

As I said, the arguments in the *New List* are complicated. Just to see the four basic key concepts appearing in the first two sentences of §14 — that is, quality, correlate, prescision, relation — we needed all the discussion from **2.2.2** through **2.2.5**. We now make a revisit to the first part of the text (W 2: 55.20-27, CP 1.558):

> §14. A quality may have a special determination which prevents its being prescinded from reference to a correlate [relation]. Hence there are two kinds of relation.
>
> 1st. That of relates [signs] whose reference to a ground [quality] is prescindible or internal quality.
>
> 2d. That of relates [signs] whose reference to a ground [quality] is an unprescindible or relative quality.

Look at the "1st" case. Unless the reader is a Peirce specialist, "relates" above may be taken to mean 'signs' as I have indicated in the brackets (see the last paragraph of **2.2.3**). Now recall that a quality is generally prescindible from relation, since it sits higher in the list. The idea was that the more mediate or abstract can be *attended to* or definitely comprehended to the *neglect of* the more immediate, but the more immediate — hence lower in the hierarchy — cannot be definitely comprehended to the neglect of the more mediate. Accordingly, in the **Last Sentence of §8** we saw a moment ago, Peirce says that a relation 'cannot' — that is *never* — be prescinded from quality, but quality "*may be* prescinded"(my emphasis) from relation. In other words, it is also possible that quality may *not* be prescinded from relation.

Thus what the first sentence of §14 considers is this: What if, for some reason, a quality cannot be prescinded from relation? This means that, by the *definition* of prescision, the quality can *not* be definitely comprehended to the neglect of the relation in which the quality stands to a correlate. When this happens, Peirce says that the quality has "a special determination," whence it is differentiated into the "2d" case. Now since the whole consideration is intended to introduce the differentiation of Index from Icon, let us first examine what this "2d" case of Index says, by taking the familiar example of a weathercock considered as an Index of wind. After this, the same weathercock example will be used to consider the "1st" case as well.

So suppose I see my weathercock through the window of my house. When it is working, it is a sign of the direction of the wind. I think, for example, that there is a wind blowing along the driveway in the direction the weathercock heads. The *directedness* of the weathercock, its heading in a certain direction in response to the wind, is the essential quality of the sign, in the sense of 'quality' Peirce talks about in the first sentence of §14. As explained earlier, we may regard the weathercock to be the 'relate,' namely the sign, and the wind, its correlate. In order to see what an Index is, we consider the *prescision* relation.

If we attend to the *directedness* of the weathercock to the neglect of the relation between the weathercock and the wind, the *directedness* no longer makes sense, because without that particular relation, we will have to think that the weathercock is moving in some random way unrelated to the wind. It is important to see that this is perfectly possible. For instance, if my weathercock had been replaced by a fake weathercock with an internal motor, it may have been turning around for amusement not serving as a sign of the wind. Obviously, I cannot tell if this is *not* the case, by just watching the motion of the weathercock through my window. This means that the very quality of *directedness* I see in the weathercock vanishes, if that *relation* is neglected. Thus the quality of *directedness* cannot be *prescinded* from the *relation* in which the relate, the weathercock, and the correlate, the wind, stand. Look at Peirce's passage again at the beginning of this section. For this reason, Peirce says that the quality is a "relative quality." This means that the *relation* between the relate and correlate is essential to the very nature of the quality considered. This is what Peirce says in the "2d case," and a sign with such a 'relative quality' is termed Index.

Now the "1st" case. Suppose I happen to see another weathercock in my neighbor's yard, which appears very similar to mine. After a couple of seconds I notice that it is the similar colors of the two weathercocks that make them look alike. In such a case I am conscious of a pair of objects in which two similar colors are brought together in comparison. As before we must consider the *prescision* relation. Let the color of my weathercock be the quality I attend to, and remove the consciousness of that *paring relation*. Clearly, this does not alter the color of my weathercock at all, since what I have before my mind remains exactly the same. In such a case Peirce proposes to regard the quality as non-relative, or internal, since it can be attended to or definitely comprehended to the neglect of the relation in which the relate, one of the two similar colors, and the correlate, the other color, stand. This is, therefore, the case in which the quality is 'prescindible' from the relation or 'reference to a correlate.' Look at Peirce's passage again. For this reason, Peirce says that the quality is "internal" to the relate. Since the quality of the sign is prescindible from the relation, it can be said to only depend on its own nature, and such a sign is termed Icon (or Likeness in the *New List*).

We can now return to the middle and last parts of the text presented in **2.1**. With regard to the "1st" and "2d" cases, Peirce adds as follows (W 2: 55.27-30, CP 1.558):

> In the former case [the '1st'], the relation is a mere *concurrence* of the correlates in one character, and [therefore] the relate and correlate are not [sharply] distinguished. In the latter case [the '2d'] the correlate is set over against the relate, and there is in some sense an *opposition*.

To see what the first sentence says, consider as an example the pattern of a polka-dot necktie. When we perceive such a tie, the slightly different but very similar colors of the detached dots will instantly merge together and form a single quality of interrelated dots. To use Peirce's favorite expression, the colors of the individual dots become 'welded together.' Take one dot as the relate, through which you see the other dots, or the 'correlates.' We do perceive the dots in relation to each other, which is why the dots work *together* as forming one unified pattern. But what is the nature of this *relation* in which the dots stand to each other? Clearly, we can prescind the relate — the one dot you focus upon — from its *relation* to other dots without changing its quality. Thus the "relation" is "a mere *concurrence* of the correlates in one character," and "the relate and correlate are not distinguished," for the dots appear welded together in one pattern or 'character.'

On the other hand, the second sentence of the citation above is better understood when taken together with the last part of Peirce's explanation. Here is what Peirce said (W 2: 55.31-34, CP 1.558):

> Relates of the first kind [Icons] are brought into relation [with correlates] simply by their agreement [in some qualitative respect]. But mere disagreement (unrecognized) does not constitute relation, and therefore relates of the second kind [Indices] are only brought into relation by correspondence in fact.

The first sentence needs no explanation. But the second sentence moves fast. Peirce considers a situation in which there is no consciously recognized agreement among things, which are *nevertheless* brought together. The point is that, when the disagreement as such is unrecognized, no mind has brought them together as in the perception of a polka-dot pattern. But examples of this case abound. Most of the objects around us, say a cup and a pen, by no means share a recognized quality, but they accidentally sit together on the desk. Since their relations are not formed by virtue of any recognized agreement, Peirce simply says that we can characterize them as "correspondence in fact." This is why an indexical relation stands out conspicuously when there is but the slightest similarity between the relate and correlate(s). The relation is just 'brute fact,' as Peirce would put it. For this reason Peirce says that "there is in some sense an *opposition*." The boundary between two polka-dots, for example, is felt as much blurred, whereas the boundary between a cup and a pen is felt sharp once recognized. In the latter "a sense of *opposition*" is involved.

We now come to this: What is the central idea in the differentiation of Index from Icon? No doubt, it is the high degree of generality of the method of *prescision*, not the naive or intuitive way of classifying signs into two kinds. Although I did use the weathercock as a familiar example, it is not that we first identify the weathercock as a fine example of an index and then seek for explanations and excuses for that identification. The kernel of the idea Peirce presents in §14 of the *New List* is to check if the represented quality is *prescindible* from the *relation* in which it stands to its object, or to its 'correlate.' If yes, then it is an Icon. If no, it is not an Icon, but an Index, so far (we shall consider Symbol in the next section). It is this *prescision relation* that constitutes the proper distinction between Icon and Index.

But once this is observed, the account should come natural to readers of Peirce as well. It is for the same reason that a portrait is mainly an Icon while a photo-

graph is mainly an Index. Note that a poorly focused photograph may resemble a person less than a well painted portrait, but the *degree* of such resemblance is inessential to the theoretical differentiation of the two kinds of signs. We cannot base the proper definitions of Icon and Index upon how much you or I feel that a sign resembles its object. It is the *prescision relation* that *defines* the distinction between Icon and Index.

3 The Derivation of Symbol

3.1 Peirce's Text

The second step differentiates Symbol from the two representations already obtained, namely Icon and Index, which Peirce does in fewer than 90 words. The following is his entire argument (W 2: 55.35-56.12, CP 1.558):

> A reference to a ground [quality] may also be such that it cannot be prescinded from a reference to an interpretant [representation]. In this case it may be termed an *imputed* quality. If the reference of a relate to its ground [quality] can be prescinded from reference to an interpretant [representation], its relation to its correlate is a mere concurrence or community in the possession of a quality, and therefore the reference to a correlate [relation] can be prescinded from reference to an interpretant [representation]. It follows that there are three kinds of representations.
>
> 1st. Those whose relation to their objects is a mere community in some quality, and these representations may be termed *Likenesses* [Icons].
>
> 2d. Those whose relation to their objects consists in a correspondence in fact, and these may be termed *Indices* or *Signs*.
>
> 3d. Those the ground of whose relation to their objects is an imputed character, which are the *general signs*, and these may be termed *Symbols*.

3.2 Commentary

As we are engaging on our main consideration of Symbol, I will divide the explanation into three stages: **3.2.1** will present some **Textual Exegesis**; **3.2.2** offers an **Intuitive Illustration**; and **3.2.3** finally introduces the **Definition** of Symbol in the *New List*.

3.2.1 Textual Exegesis

First, as before, we remind ourselves that a quality, the more mediate, is in principle prescindible from representation, the more immediate, since the shallower in the list is always prescindible from the deeper in the list. This does not work in the other way round because if we try to lift up the deeper structure, we will have to necessarily bring the superstructure together with it. Although the superstructure is generally prescindible from the deeper structures, Peirce considers, once more, in the first sentence quoted above: What if a quality cannot be prescinded from representation? That is, what if a quality, which is at the very surface in the hierarchy of the derived categories, is for some reason, so tightly connected to the deeper layer of representation, such that the quality cannot be prescinded from representation? Thus there are two cases to consider again.

The third sentence of Peirce in **3.1** considers the case in which a quality *can* be prescinded from representation. In this case Peirce quickly observes that if a quality survives prescision from an interpretation, this means that the quality is unaffected by the specific interpretation of the relation between the relate and correlate. Then its nature is not affected by the specific relation between the relate and correlate, from which it follows that the quality is internal to the relate. This is why Peirce almost repeats above, "its relation to its correlate is a mere concurrence or community in the possession of a quality,' which is nothing but the explanation of Icon he stated earlier (see **2.1** and **2.2.6**). In other words, the *first case* reduces to Icon. Therefore, such representation of a quality in a propositional structure will *not* give rise to a different kind of sign. Hence Peirce is done with the case where the quality *is* prescindible from representation.

The new case, therefore, is when a represented quality *cannot* be prescinded from representation. Note that such a sign has to be at least an Index since *representation* is not prescindible from *relation*, and that this is the *only possible new case*, since representation is already the deepest determination that *directly unites* substance. That is, nothing lies beneath representation, except for the substance itself to be united. Thus Peirce thinks that he only needs to label anew the last kind of representation. To repeat, this is the case in which a represented quality cannot be prescinded from reference to an interpretant, or in short from 'representation.' Hence Peirce concludes (W 2: 56.4-12, CP 1.558):

> It follows that there are three kinds of representations.
>
> 1st. Those whose relation to their objects is a mere community in some quality, and these representations may be termed *Likenesses* [Icons].
>
> 2d. Those whose relation to their objects consists in a correspondence in fact, and these may be termed *Indices* or *Signs*.
>
> 3d. Those the ground of whose relation to their objects is an imputed character, which are the same as *general signs*, and these may be termed *Symbols*.

We have no space to define the term 'ground' in this paper, but it will suffice to put it this way: The "ground" in the "3d" case above connotes the abstracted content of the quality represented in the propositional structure. Note that Peirce is trying to characterize the *relation* of such a 'ground' *to their object* in the condensed phrase "the ground of whose relation to their objects," whence he says that the ground is an 'imputed character.' Since the term 'character' in Peirce's writings can be taken to mean the 'quality' of a sign, an "imputed character" can be also phrased 'imputed quality.' I will give below a more intuitive account of what is going on.

So here is a quick summary. Index was derived from Icon in the fist step considered in section **2**. The current section turned to the derivation of Symbol from Icon. Figure **3** below presents four diagrams that show how the prescision relation differentiates Index from Icon, and Symbol from Icon and Index. The *heavy lines* indicate that the bonds between the represented quality and the more immediate categories are *tight* and hence *not* prescindible. The diagram third from the left corresponds to the case in which the quality *can* be prescinded from representation. That is, the representation reduces to Icon, as we saw in the second paragraph of the current section.

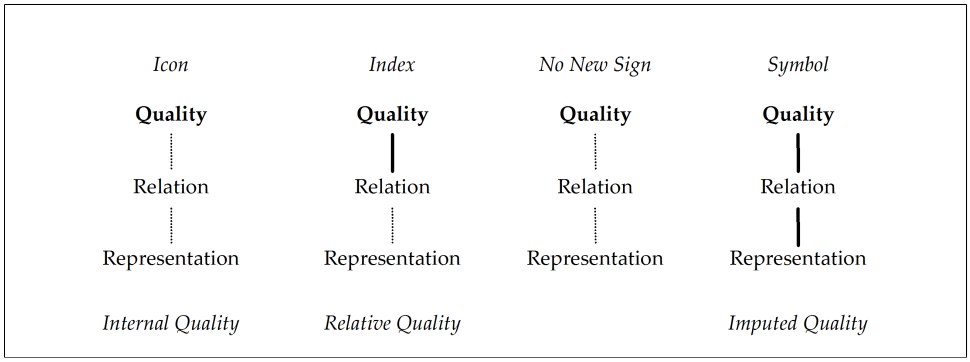

Figure 3. The derivations and the prescision relation. The heavy lines signify that the Quality cannot be prescinded from Relation or from Representation.

It is worth remarking that Peirce did *not* decide in advance that there should be three kinds of signs with regard to their relations to their objects. The prescision relation first distinguished Index from Icon, and then Symbol from Icon. To put it another way, the analysis of the *New List* forces that there are three kinds of representations, and no more than three. Note also, that it is *only* in the *New List* that Peirce rigorously demonstrates *why* there are *exactly* three kinds of representations or signs in relation to their objects. In his later writings, he discusses examples, gives formulations of the three signs, but no such rigorous demonstration is found.

3.2.2 Intuitive Illustration

If a sign is a Symbol, Peirce thinks that the qualitative respect in which it is related to its object is an 'imputed character.' What does this mean? The quickest way to grasp what Peirce is saying is to combine what we have observed up to this point. Figure 4 below collects our knowledge together.[9]

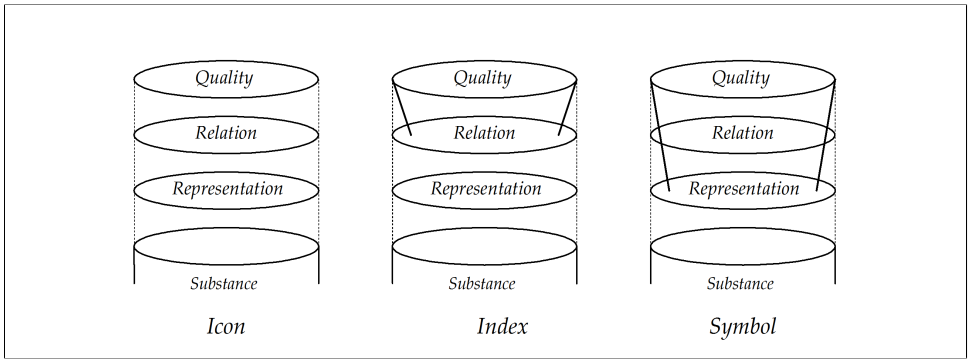

Figure 4. Icon, Index, and Symbol in the *New List*. The dotted lines on the sides signify that they all directly unite substance, while differing from each other in terms of the prescision relation.

An Icon, as illustrated on the left, can be seen as a representation that refers its object to our mind without directly touching the layer of Relation beneath. This

[9] Since BEING plays no role in subsequent considerations, I will omit it from Figure 4 and Figure 5 below.

indirectness or detachedness is visualized by the vertical dotted lines on the sides. Figuratively speaking, therefore, an Icon only mirrors something below without actually reaching it. This is why Peirce for instance stresses that an Icon "really stands unconnected with them [objects]"(EP 2: 9, c.1894). If, however, a quality is *not* prescindible from relation, the quality of the sign, being a 'relative quality,' strikes its root much deeper into the structure such that it comes into direct contact with the correlates on the level of *Relation*. As the second diagram illustrates, in this case the quality drops off much deeper into the middle layer, stretching toward the more immediate, although it does not deepen further. This is the Index. Further, if a quality is not prescindible from reference to an interpretant, or 'representation' in short, it descends even deeper toward the most immediate or external layer of substance as illustrated on the right. In this specific sense, the Symbol expresses the deepest or the most far-reaching kind of qualities of the three signs.

Now recall the following three things in the *New List*.

1. A **Quality** is a determination of substance (see **2.2.2**).
2. **Correlates** are phases of objects (see **2.2.3**).
3. **Relation** is defined as 'reference to a correlate' (see **2.2.5**).

Based upon this, we can modify the model of Symbol in Figure 4 above into a model like the one in Figure 5, by replacing the thin middle layer of *Relation* by phases of correlates, which constitute the *object* of the sign, or Symbol in this case.

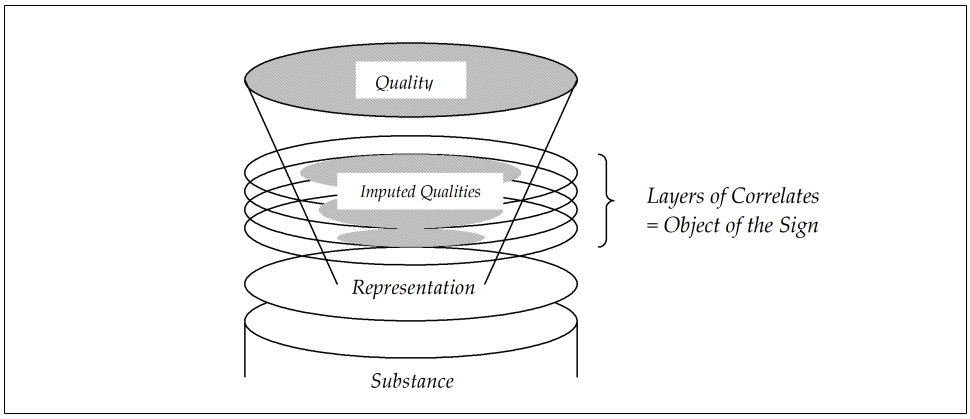

Figure 5. Intuitive illustration of Symbol in the *New List*.

As illustrated, the quality, whose abstracted content is the ground, does not merely reach the correlates beneath it but permeates them, as it were. This is why Peirce says that the quality, when seen in abstraction, is an 'imputed character.' Metaphorically speaking, the quality in the propositional structure drains down toward the layer of *Representation* by which it 'imputes' its own nuance to the correlates, namely to its 'object.' In this regard we may say that a Symbol bottoms far deeper than Icons and Indices, so as to influence our world view by imputing its own character to the very root of experience.

To avoid confusion, however, it is to be remembered that Icons and Indices do respond to the deepest layer as well, since they are forms of *Representations*. Icons and indices, therefore, do *not* fall short of directly uniting the manifold of sub-

stance.[10] They work in their own ways. But what we should underscore in the current section is the *unique locus* that Symbol occupies in Peirce's theory of representations. Symbol is the deepest or the most far-reaching of all three signs, and in turn Representation is the deepest or the most external of the three derived categories. We may thus say that it is precisely this *unique locus* that defines the unique nature of Symbol in Peirce's theory of signs.

3.2.3 Definition of Symbol

From these considerations, we may give the definition of Symbol in the *New List* as follows. It is, of course, merely a rephrasing of the "3d" kind of representation we saw above.

> **Definition**
> A Symbol is a sign whose quality is imputed to its object.

Of course we could always say that a Symbol is a sign whose quality cannot be prescinded from reference to a correlate and from reference to an interpretant. That is the most rigorous definition. But its meaning is not intuitively graspable if put that way, which is why I have attempted to spell out the idea, and suggest the definition above. Note that in a letter to Lady Welby drafted in December 1908, Peirce still mentions the idea of imputation in reference to the *New List* (EP 2: 481-482, CP 8.342, 1908).

It is, on the other hand, natural to wonder if such a concise definition of Symbol in the *New List* is consistent with the other things Peirce says about Symbol in his writings. As far as I see, the answer is, Yes. In the rest of this paper, therefore, I will briefly go over five sets of Peirce's well-known passages on Symbol as case studies. Needless to say, the passages are extremely selective and allow for varying interpretations. But they will mostly confirm the consistency of the definition above.

4 Case Studies

4.1 Peirce's Text 1866

(i) Lowell Lectures on the Logic of Science (W 1: 468)

> The third and last kind of representations are *symbols* or general representations. They connote attributes [qualities] and so connote them as to determine what they denote. To this class, belong all *words* and all *conceptions*. Most combinations of words are also symbols. A proposition, an argument, even a whole book may be, and should be, a single symbol.

(ii) Lowell Lectures on the Logic of Science (W 1: 475)

> A symbol is a general representation like a word or conception. [...] A symbol is a representation whose essential Quality and Relation are both unprescindible — the Quality of being Imputed and the Relation ideal.

Commentary: The peculiarity of the first quotation consists in the *determination* of denoted objects by "attributes" or qualities that the Symbols connote. For re-

[10] See the last paragraph of 2.2.5.

call that in Peirce's formulation of the sign relation, it is *always* the *object* that *determines* the sign, which in turn determines the interpretant, such that the *object* mediately *determines* the interpretant. For the sake of simplicity, take the phrase "what they denote" to mean 'objects.' Then Peirce is saying here that the Symbols connote attributes by which they determine their objects. This is because Symbols *impute* their attributes to their objects. The second passage, on the other hand, defines Symbol in the same way as in the *New List*. I will not discuss the phrase 'the Relation [is] ideal' here — Peirce roughly means that the determining relation is degenerate.

4.2 Peirce's Text 1895

Short Logic (EP 2: 17, CP 2.295)

> A *symbol* is a sign naturally fit to *declare* that the set of objects, which is denoted by whatever set of indices may be in certain ways attached to it, is represented by an icon [representation of a quality] associated with it.

Commentary: The italics on 'declare' are mine. A symbol *declares* what quality or icon *should* represent the set of objects of the Symbol. This is done *without* regard to indices attached to it, since whatever the objects are, Symbols are able to impute qualities to them. If I declare that X, whose quality is Q, is a symbolic representation of an object Y, I can always *impute* that quality Q to the represented object Y.[11] Hence Peirce says elsewhere that a symbol "is a law [artificial or otherwise] *governing* its Object" (EP 2: 276, 1903, my italics).

4.3 Peirce's Text 1902

(i) Minute Logic (CP 2.92)

> A Genuine Sign is a Transuasional Sign, or *Symbol*, which is a sign which owes its significant virtue to a character [quality] which can only be realized by the aid of its Interpretant. Any utterance of speech is an example. If the sounds were originally in part iconic, in part indexical, those characters have long since lost their importance. The words only stand for the objects they do, and signify the qualities they do, because they will determine, in the mind of the auditor, corresponding signs.

(ii) Dictionary of Philosophy & Psychology (CP 2.304)

> A *symbol* is a sign which would lose the character [quality] which renders it a sign if there were no interpretant. Such is any utterance of speech which signifies what it does only by virtue of its being understood to have that signification.

Commentary: A symbol, by definition, can neither be prescinded from Relation nor from Representation (recall Figure 3 in **3.2.1**). By Representation is meant 'reference to an interpretant.' Peirce says in the second passage that a symbol would lose its quality 'if there were no interpretant.' Evidently, this is just what the definition of Symbol requires, for without the interpretant the symbol would not impute its quality to objects (note the 'were' in subjunctive mood). In the first passage, on the other hand, Peirce says that words 'signify the qualities they

[11] Compare this with the "conventional imputation" Peirce talks about back in the 1860's (EP 1: 51, CP 5.309, 1868).

do,' *because* they will 'determine' the corresponding signs, which are of course interpretants. Determination thus means *imputation* here.

4.4 Peirce's Text 1903 - c.1904

(i) Sundry Logical Conceptions (EP 2: 274, CP 2.292, 1903)

> A *Symbol* is a Representamen whose Representative character consists precisely in its being a rule that will determine its Interpretant.

(ii) New Elements (EP 2: 307, c.1904)

> A symbol is defined as a sign which is fit to serve as such simply because it will be so interpreted.
>
> [...]
>
> A symbol is a sign fit to be used as such because it determines the interpretant sign.

Commentary: For our purpose, it suffices to observe that the passages are consistent with the general definition of Symbol. However, it might now occur to the reader, after seeing similar remarks, why a Symbol is said by Peirce to *determine* its interpretant. For once again, Peirce's definition of sign *always* has it that the *object* mediately *determines* its interpretant. Are not the explanations of Symbol in these texts in conflict with his basic definition of sign? My reply is, No. There is a step of reasoning unexpressed by Peirce, and moreover, it is at this point that our definition in **3.2.3** starts to speak more. For consider this: If a Symbol imputes its own quality to its object, and hence behaves as 'a law governing its Object' (see **4.2**), it follows that the determination of the interpretant by the object is now part of a larger cycle of determination. That is, the semiosis,

> Object $\rightarrow$ Symbol $\rightarrow$ Interpretant,

is now understood as

> Symbol $\Rightarrow$ Object $\rightarrow$ Symbol $\rightarrow$ Interpretant,

where $\rightarrow$ designates the usual determining relation, while $\Rightarrow$ designates *imputation* (do not take the arrows to simply mean temporal succession). Since the first chain is a *subchain* of the second, Peirce's explanations are consistent. Note that without the notion of *imputation* it is hard to explain why Peirce thinks that *both* the object determines the interpretant *and* the Symbol (also) determines the interpretant. Observe, too, that a symbolic semiosis, the second chain, appears to have a self-feedback structure, and that it nevertheless requires an object — its instantiation, if you please — in order to realize its effect. As Peirce specialists would recognize, this is what Peirce holds about the operation of 'laws.'

4.5 Peirce's Text c.1911

A Sketch of Logical Critics (EP 2: 460-461)

> But, I had observed that the most frequently useful division of signs is by trichotomy into firstly Likenesses, or, as I prefer to say, *Icons*, which serve to represent their objects only in so far as they resemble them in themselves; secondly, *Indices*, which represent their objects independently of any resemblance to them, only by virtue of real connections with them, and thirdly *Symbols*, which represent their objects, independently alike of any resemblance or any real con-

> nection, because dispositions or factitious habits of their interpreters insure their being so understood.

Commentary: In the *New List* Peirce uses 'Likeness' for Icon, but note that he still mentions 'Likeness' around 1911. The descriptions of Icon and Index are standard. Symbol is, however, explained 'independently' of 'any resemblance or any real connection' to its object, which sounds slightly different from what we saw in the differentiation of Symbol from Icon in section **3**. It is, however, for this very reason that our definition of Symbol has explanatory value. Peirce is now emphasizing the law-like *imputing* behavior of Symbols, such that whatever imputes its quality to objects in law-like manner should be seen as a Symbol. That is, if events conform to the qualities of *X* by virtue of dispositions or habits in their interpreters, then *X* should be seen as a Symbol. This is of course why *natural laws* are regarded as Symbols by Peirce.

5 Conclusion

Throughout this paper I have maintained that the definition of Symbol given in section **3** claims fundamental significance in Peirce's semeiotics. This coheres well with Peirce's high evaluation of the *New List*. My point can also be further highlighted through a reflection upon the implication of the last few remarks in **4.5**. As is well known, conventional signs, and hence most artificial signs including words, are Symbols in Peirce's semeiotics. But so are *natural laws*. What is the common property shared by words and natural laws? There is nothing conventional or artificial about natural laws, especially for a scientist like Peirce. It is in view of such extremely divergent classes of signs, identically regarded as Symbols by Peirce, that the significance of the definition of Symbol in the *New List* becomes more perceptible.

The various considerations in this paper lead us to make another suggestion, which is this: Peirce's semeiotics may give rise to one, unique definition of Symbol, despite the fact that Peirce offered numerous formulations. This is a *uniqueness thesis* about Symbol, namely, the thesis that there is but one and only one definition of Symbol for Peirce. A seemingly strong claim would make more sense if considered in the following way. Symbols as representations have to eventually find their place in Peirce's theory of categories, since there is no evidence that he ever abandoned them. Following Peirce's argument in the *New List*, I have characterized Symbol as the deepest form of Representation, or more correctly, the class of representations that reach out to the most external layers of cognition and impute their qualities to them. Thus if we wish to hold that there is more than one definition of Symbol, we would have to show that Symbol can have a more internal or external locus in Peirce's theory of representations, which seems very difficult. If so, however, the *uniqueness thesis* follows. That is, symbols as representations occupy a unique conceptual locus in Peirce's theory of categories, which in turn *uniquely* defines what Symbol is for Peirce.

Finally, it goes without saying that I have left aside many important aspects of Symbol in Peirce's semeiotics. I do not profess to have shown, for instance, how the arguments of §14 of the *New List* stand to the broader background of Peirce's philosophy. But I will look for other occasions to discuss such matters.

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The spatial dimension of history: propagation of historical knowledge via open-air museums, leisure parks and motion pictures

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Abstract

Man's environment is full of references to history. Archaeological sites and cultural landscapes are examples. History is a constituent of our social identity. In this sense, on a social level, it has an integrating function and helps to structure and canalize social behaviour. In this paper we shall examine, taking archaeological sites, open-air museums, leisure parks and motion pictures as examples, how this form of promotion of history works and what effect it has on society.

Keywords: progress thinking, history promotion, space & time perception, social identity, sociology & ethics of science

1 Introduction

The propagation of archaeological knowledge via staged archaeological sites, open-air museums, leisure parks and films makes use of a reconstructed archaeological/historical environment.

While designing such places, one is trained to concentrate on the "in-situ" quality of the site in order to provide the public with a feeling for the original site documented by archaeological fieldwork. Recent examples include the Viking settlement of Haithabu in northern Germany (Schleswig-Holstein) (Ickerodt 2007:269 Fig. 4), where more reconstructions of the original buildings are being erected, and the Hahnenkooper-Mühle, a Bronze Age long-house at Rodenkirchen, Lower Saxony (Ickerodt 2007:269 Fig.5), as well as the reconstructions of Stone Age dwellings at the Hitzacker Archaeological Centre (Archäologischen Zentrum Hitzacker), Lower Saxony.

Implicitly, the archaeological world assumes that the significance of the information and knowledge gathered by research and fieldwork can be put over to the public by means of these sites, sometimes combined with the activities of reenactment groups. There is a common belief that our archaeological/historical background can be divided up in order to provide historic insights to the visiting public. The self-chosen indicator of quality of these exhibits is their degree of authenticity. And a central aspect throughout is the conviction that the archaeological/historical facts are self-evident.

In addition, one should take into account that "history" can only be generated from a string of historical facts by knitting them together into a narrative. Such

meta-narratives[1] dealing with the different facets of history[2] are the vehicles that make historical understanding possible. Such a meta-narrative, mythologically or scientifically legitimated, is always a social construction which makes use of historically evolved and socially accepted structures. These meta-narratives help each individual person, depending on their individual degree of perception, i.e. their learned ability to understand place-time relations to generate social and individual behaviour. This process must be understood as being based on past experience and oriented on future aims; socially inherited perception is combined with personal experience of life. This complex of preexisting (i.e. inherited) social "guidelines" and the way each individual interprets his own environment in fact determines our perception of historical facts: It steers (1) our selection of historical facts, (2) the evaluation process with respect to their plausibility, and (3) it enables us to crosslink historical events, episodes etc. into an overall system.

Figure 1. The megalith site of Flögeln as an example of an archaeological site made accessible to the public (photo by the author).

In this connection it is crucial to realize that the understanding of an overall historical system and/or of its single parts depends on one's own group affiliation. This affiliation allows one to correlate historical evidence and relics into a meaningful and reasonable overall system or, in contrast and as an extreme example, it precludes the understanding of archaeological/historical facts.

[1] These are the meta-narratives in the sense of H. White (1973; 1996), which can be understood in the sense of a founding myth.

[2] History of technology, local, regional and world history, and the history of mankind.

Therefore it seems apt to split the perception and understanding of history into two modes of perception. The basic mode is a socially anchored mode of perception. It is closely related to society's construction of reality and is learned unconsciously during one's life. It is the product of a historical process, which is normally unaffected by active social control, even if sometimes it can be consciously steered. The second mode of perception is a more distinct, one could say an analytical, form dealing with place-time relations. Both modes of perception are individually and socially anchored, are interactive, and can only be separated from each other analytically. Such an overall perception forms an essential component of one's own local, regional and national identity.

These preliminary remarks lead us to the topics to be dealt with: (1) How is archaeological knowledge embedded in socially generated historical understanding and how does this influence scientific knowledge and thinking? (2) How must archaeological information be processed to make it understandable to the layman? And lastly concerning the social influence of archaeology: (3) What are the responsibilities of the archaeological community?

Figure 2. View of the reconstructed Neolithic settlement and landscape at the Archäologisch-Ökologisches Zentrum Albersdorf (AÖZA) (photo by the author).

These questions pose further questions concerned with the philosophy of science and its two domains, the sociology of science and the ethics of science.

Generally speaking, the sociology of science helps us to understand how archaeological research is embedded in society and the basic preconditions necessary for its incorporation. Research on the sociology of science, in this case ar-

chaeology, is not only concerned with the history of archaeological research and thinking, but also deals with its social acceptance, as well as the determining influence of the social environment on archaeology as a discipline. In this sense, the sociology of science encompasses the self-reflexive process of establishing one's own scientific understanding as well as generally accepted plausibilities. Such an approach allows a basic process of self-criticism in terms of methods, theories and interpretation patterns beyond the individual case. It helps to ensure quality in the long-term.

However, at the same time, the sociology of science deals with the influence of archaeological knowledge on social mentality in terms of the social incorporation of archaeological research by society as well as in terms of the social treatment of archaeological data. From the perspective of content, the archaeologist deals with the social and sub-cultural processes of how historical narrations become established. On a practical level, such an approach serves to ensure quality in the process of propagation of archaeological/historical knowledge in the sense of didactics of archaeology.

Figure 3. Reconstructed Bronze Age dwelling at Rodenkirchen, Hahnenkooper-Mühle (photo by the author).

On a more abstract level, the sociology of science helps archaeology to understand the surrounding social environment, which has a major influence on archaeological research, in terms of structure and content. This knowledge is a necessary tool for research on the second topic, the ethics of science.

To attain a truly scientifically based didactics of archaeology, one needs to take the first basic step of assuring one's self of one's own social environment in order

not to abandon scientific facts in favour of cultural arbitrariness but to promote truly archaeologically/historically based knowledge.

2 Founding myth and historical thinking

In our science-based society, myths and superstitions are commonly percieved and communicated as a primitive form of thinking belonging to the dawn of mankind. Even when myths[3] are touched on, they appear at the same time to be suppressed from our seemingly logos-based daily life. The philosopher Emil Angehrn (1996), in his analyses „Ursprungsmythos und Geschichtsdenken“ (Founding myth and historical thinking), comes to the conclusion that this antonymic relationship between logos and mythos does not exist because of the fusion of myth and science within metaphysics. This hidden relationship between myth and logos is normally not taken into consideration by scientific research and its incorporation by society. Sometimes it is not even seen. Nevertheless, the mystification of archaeological knowledge is commonly used as a appropriate medium to escape from technicist ratio within a secularised society[4].

Figure 4. Reconstructed Viking settlement of Haithabu associated with the Schleimündung nature-conservation area (photo by the author).

[3] The horror novels of H.P. Lovecraft (1890-1937) (Mosig 1997) are good examples of the social process of myth creation in modern times based on scientific knowledge and dealing with the beginning of mankind in the cosmos.

[4] This phenomenon has been referred to as an “ersatz-enchantment” (Ickerodt 2004a:54, 172ff. see also Ickerodt 2005a).

While examining the relationship between myths and archaeological/historical research against this background, both can be identified by their content as a form of the reflection of one's own origins. Both are, generally speaking, elements of man's ability to deal with his origin and, on a more specific level, to pass on experience of the past to forthcoming generations. Mythologically and historically legitimated forms of thinking have, in different ways, a self-constituting and legitimating function. They explain how our world has become the place that it is today. In this way, both may legitimate social institutions and social behaviour. They help to stabilize man's existence and provide legal security. "Die Verwurzelung in der Herkunft ist eine Strategie der Identitätssicherung. Wer weiß, woher er kommt, weiß, wer er ist."[5] (Angehrn 1996:307)

At the same time Angehrn (1996) sees, apart from recognising one's own origins, a second property characteristic of the mythos. As far its social function to provide a social identity and assure existence is concerned, the mythos has if necessary the ability to question its own origin, to break free from traditional structures and conventions[6] that have become obsolete, and to replace them by newly created traditions (Ickerodt 2005a). This same effect has been discussed elsewhere (Ickerodt 2004a:185) in relation to pictures of prehistoric man. Prehistoric man has in fact become an icon for one's own origins. As our primitive ancestor he provides identity within the realm of the continuity-paradigm[7]. He is therefore, as mentioned above, an ambiguous figure. Not only does he provide an identity, but also he is used as a powerful but symbolic argument within the process of social differentiation on a society level as well as on a national level. On one hand, prehistoric man is a symbol of one's own roots, but on the other hand, on a more symbolic level and based on the concept noncontemporaneous contemporaneity, he is a symbol for social competition. Basically, the image of prehistoric man oscillates between a founding hero and primitive obstructer of social, economic and technological progress.

Following on from these ideas, it is aimed to show the social impact of archaeological knowledge as imparted by archaeological sites made accessible to the public, and in open-air museums, leisure parks and motion pictures.

3 Research target: historical landscapes in open-air museums, leisure parks and motion pictures

The environment that surrounds us, seen not only from a scientific perspective, is full of historical features and relics. As an archive it contains evidence of geological transformation and biological and cultural evolution. In this context, space, with all its historical information, can be seen as the spatial dimension of history.

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[5] "Recognising one's own origins is a strategy to secure identity. Who knows where he comes from or who he is?" (translation by the author)

[6] In this connection a cybernetic model of historical understanding has been developed that is based on evolutionary premises (Ickerodt 2006).

[7] In Germany the archaeologist Gustav Kossinna (1858-1931) developed the method of "ethnische Deutung" (ethnic interpretation) as a bourgeois method of self-assurance; meanwhile in the United States the "direct historical approach" was developed as a comparable method to investigate within the same scientific rational the roots of the American aboriginal societies.

It is not only an archive, but at the same time the locality of historical teaching as initiated for us by Petrarca (1304-1374).

Figure 5. Reconstructed Slav castle of Raddusch (photo by the author).

At that time ruins were seen by Petrarca as monuments that were perishable (Böhme 1989; Ickerodt 2007), while in the second half of the 19th century this form of spatial-history narration is supplemented by a further aspect related to the name of Heinrich Schliemann (1822-1890). The public became increasingly aware of the fact that apart from the visible ruins, localities known from the bible, or that are historically documented, still remain as archaeological sites and thus can be referred to as historical evidence (Ickerodt 2004a). This awareness supplements the interpretation of landscapes-with-ruins in the sense of "perishable" monuments by two aspects. On one hand ruins are evidence of one's own beginnings and on the other hand they are used within social competition as evidence of the treat of cultural regression (Ickerodt 2004b).

The spectrum of the archaeological/historical landscapes that are part of this research (Table 1) comprises archaeological sites made accessible to the public, as well as reconstructed dwellings and other structures based on archaeological evidence which are located in open-air museums, leisure parks or used in motion pictures.

They can be divided on the basis of their characteristics into two categories each with two sub-categories: (1) authentic archaeological/historical sites with (1a) original material, and (1b) in-situ reconstructions based on the archaeological record, and in contrast, (2) fictitious archaeological/historical sites, only authentic by virtue of their content. Examples of (2) are reconstructed dwellings that have been identified on archaeological sites elsewhere. In contrast to (1)

therefore, there is no historical reference to the locality chosen for presentation. (2) comprises two sub-categories: (2a) proven archaeological/historical sites, and (2b) chosen sites inspired by but unrelated to archaeology.

Fig. 6: At the Dino Park in Münchehagen (Lower Saxony, Germany) with its authentic fossil dinosaur tracks one can see scientifically inspired life pictures of Neanderthal man in front of their tent.

Figure 7. The Natureum in Neuhaus (Lower Saxony, Germany) has a scientifically inspired camp of prehistoric man, which is located in a small clearing and is made accessible along a narrow path in the plant cover (photo by the author).

Category (1a) authentic archaeological/historical sites with their original substance, is commonly an output of archaeological fieldwork and the relevant public relations work. It is usually well accepted by an archaeologist to use "his" archaeological site as a tourist attraction[8] (Fig. 1), since it promotes his own research; in case of a motion picture or in fiction, an archaeological site may be used as an "authentic" backdrop[9]. The time scale ranges from the Neolithic to the Middle Ages.

Category (1b), reconstructed dwellings based on the archaeological record at the original site (Figs. 2 to 5), as well as (2a) the fictitious, scientifically proven or (2b) inspired archaeological/historical sites (Figs. 6 to 9) are quite comparable to the first group. Their time scale ranges from the Palaeolithic to the Middle Ages.

While in the above cases the visitor can approach the past by aesthetic means, whereby archaeological knowledge is imparted via the emotions, this approach must be seen against the background of the ethics of science.

Figure 8. At the Erse leisure park in Uetze (Lower Saxony, Germany) one can view a scientifically inspired prehistoric environment (photo by the author).

[8] Examples of northern Germany: Ahrens (1976), Alsdorf (1980), Bärenfänger (1999), Führer zu vor- und frühgeschichtlichen Denkmälern (1976 a to c), Hesse (2003), Lauer (1979; 1983; 1988), Schön (1995), Sielmann (1975), Zeitspuren 1998. Examples of Austria: Bichl, Griebl, La Speranza, Reisinger (2003); Examples of megalith sites: Bock, Fritsch, Mittag 2006, Burl 1995, Gottwald 1991a, Gottwald 1991b.

[9] For example "Tea with Mussolini" (USA 1999), "The match-maker" (USA 1997).

3.1 Case study: the reconstruction of Jamestown

An especially influential medium for imparting archaeological knowledge is through motion pictures. Examples from recent years are Mel Gibson's "Apocalypto" (USA 2006) and Wolfgang Petersen's "Troy" (USA 2004), which were incidentally both enormous box-office successes. In the first case Gibson sets the plot and his fictitious reconstruction of the past in pre-Columbian Meso-America shortly before the arrival of the first Europeans. He depicts a cruel archaic world ruled by the struggle for life and the survival of the fittest. His reconstructed urban settings are extremely noteworthy on account of their strong visual effect, providing the spectator with a far-ranging insight into the life of the ancient Maya. On the other hand there is Petersen's film adaptation of the Trojan war, which, in spite of its recognizable adaptation of actual archaeological knowledge, is somewhat overinterpreted.

A totally different example can be found in Terence Malick's motion picture "The New World", which is set in the early 17th century at that point of time when the first English colony in North America was founded. Malick aims at the ultimate in authenticity and makes the film look as if it were a documentary film. William Kelso, Director of Archaeology at the Association for the Preservation of Virginia Antiquities, was invited as consultant. He saw his advice and his vision of the reconstruction of Jamestown widely implemented.

The film-set with modern technical equipment was erected by Jack Fisk, the production designer, in cooperation with his archaeological consultants within 30 days no further than 7 miles from the original location. Here, as well as in the case of the reconstructed native American settlement and the associated fields of crops, one was very concerned to achieve the highest possible degree of authenticity. Apart from using archaeological data, the producer utilised historical pictures and native American consultants. Furthermore, when possible, only local raw materials were used and in the case of the reconstructed native American fields one was very careful to use historical cultivation methods as well as original seed (maize, melons, tobacco, etc.)

While shooting, the actors and the crew felt as if they were time-travelling. This experience and the process of social reassurance is articulated on the associated DVD in interviews with the film-staff and actors. Each of them, regardless of their own origin, was really concerned with portraying their Anglo-American or native American roots, from which modern North America evolved.

3.2 Case study: Time pathways

Apart from the general process of historical recollection ("Where do I come from?"), the staged authentic archaeological/historical park with its (1a) original substance or (1b) reconstructions based on the archaeological record, are commonly accompanied by a time axis. This time axis can be related to historic data or may be just a symbolic way of putting over cultural evolution. In both cases, it is just a practical tool to give the visitor a feeling for chronology as he walks along a time-line. Examples of such a time axis related to absolute data can be found at the Slav castle of Raddusch (Fig. 10) and the Neanderthal Museum at Mettmann (Fig. 11).

Figure 9. At the Erlebniszoo Hannover (Lower Saxony, Germany) the reconstruction of a prehistoric dwelling is situated near the pathway of evolution (photo by the author).

Here, as well as in the scientifically (2a) proven or (2b) inspired archaeological/historical sites, one may also find the symbolic alternative of such a time-pathway as a medium to impart human biological or cultural evolution. An especially interesting example can be found at the ErlebnisZoo Hannover (Hanover Experience Zoo). Here, footprints are used to represent human biological and cultural evolution. In a section called the "Path of Evolution" (Evolutionspfad), one can see footprints, inspired by the Laetoli tracks of East Africa (Fig. 13b) which turn uphill into footprints of soles of shoes (Fig. 13a). The shoe prints end at an excavation, symbolizing the search for human origins. A look back over one's shoulder seems to demonstrate man's social and scientific progress. This concept is based on simple teleological logic (Ickerodt 2004a: 49f.; Cat.7.2.) dominated by (mostly hidden) social Darwinist assumptions: Things are the way they are because they succeeded in competition (Ickerodt 2004b).

3.3 Case study: Footprints and Tracks

In order to make the last statement more comprehensible, one has to contemplate the iconographic meaning of footprints and tracks. Seemingly, they have been held as highly significant since the time of primitive man. On a very practical level, prehistoric hunters certainly used them to read the past in the present in order to make decisions for the future. With his knowledge of his own environment, the hunter could analyse the tracks and could predict vital information: Where can I catch my prey? Where do I expect predators?

Figure 10. At the entrance of the Slav castle of Raddusch is situated the so-called "time plank" (above). Inscriptions provide a chronological framework (below) (photo by the author).

His ability to read and understand footprints and tracks made it possible to pursue his prey and avoid predators. Such a process of historical reflection allowed prehistoric man to contemplate the way he had covered and, on a more abstract level, to reflect his life-history. On this more elaborate level, the ability to interpret tracks could now be fitted into more and more complex interpretation patterns, to help to structure future behaviour.

All in all, it is no wonder that human tracks have a very special meaning and are culturally deeply anchored (Ickerodt 2004a:100f.; 2004b:13-16.) so that even contemporary advertisements can use the picture of footprints or tracks as a proof or a symbol for one's own existence and path of life and, on the other hand, as a metaphor for goals that one aims to reach (Ickerodt 2004a: Cat. 3.2.). But the metaphor of footprints and tracks has a second meaning. In a figurative sense footprints symbolize the process of detection. Archaeologists as well as detectives are constantly searching for "suspicious" features and clues.

It is not by chance that this combination of evolutionary tracks, footprints and an excavation are used in the ErlebnisZoo Hannover. Here is the place where the visitor can achieve his "incantation of origins". In a practical and simple way he is enabled to recognize the order of things and events and assure himself of the functionality of cosmic order. The look back verifies his own place in the world

and confirms social and scientific/technological progress. This process is based on the teleologic concept mentioned above (Ickerodt 2004a: 49f.; Cat.7.2.).

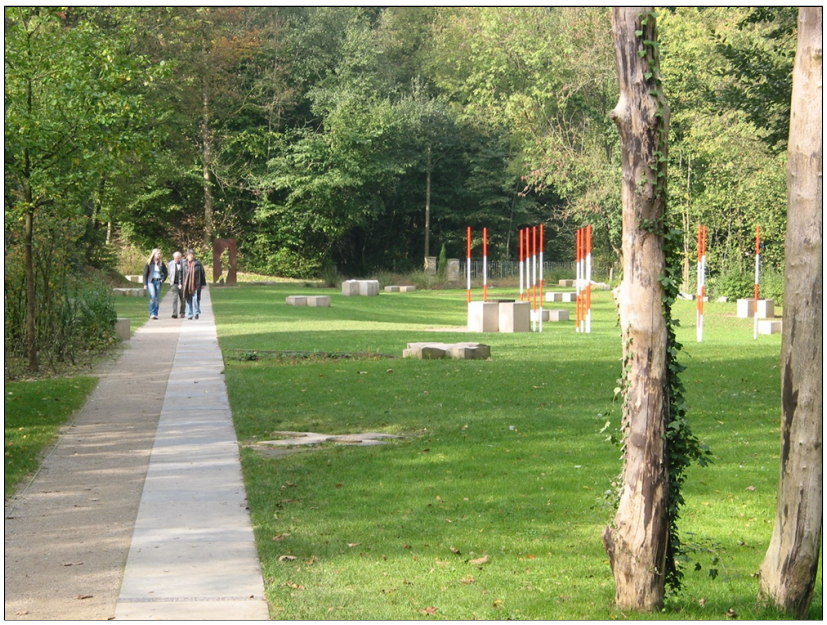

Figure 11. Close to the site where the Neanderthal remains were discovered at Mettmann, the chronological dimension is put over by the so called space-time axis (photo by the author).

This symbolic representation of human evolution, well known from "2001 A Space Odyssey" (GB 1968), can be found in a more condensed form at Mettmann. Within the area of the site where the Neanderthal remains were found, one can recognize a variation of this motif. Near the space-time axis here, is a cross made of concrete on which human (bare) footprints are crossed by footprints of an astronaut's boot as left on the moon (Fig. 12).

Figure 12. At the Neanderthal Museum is a cross made of concrete on which human (bare) footprints are crossed by footprints of an astronaut's boot as left on the moon (photo by the author).

The same metaphor is used by the organizers of the exhibition "Roots / Wurzeln der Menschheit" (Roots / Origins of mankind) that could be viewed between 8 July and 19 November 2006 at the Rheinisches Landesmuseum (Rhenish Federal Museum), Bonn. One could follow a track of human Laetoli footprints leading to the exit where they changed into moon-boot prints in front of a moon landscape.

This is the way fossilized human remains, artefacts, archaeological sites, reconstructions in open-air museums, leisure parks, motion pictures and dioramas are organized for the layman within a context of progress thinking, which is in fact well known since it can be found in a comparable form in contemporary advertisements (Ickerodt 2004a: Cat.7.2 Nr. 9-15; 2004b:14 esp. footnotes 8 & 9) and in motion pictures[10].

4 The "big" narrative: meta-narrative development thinking

The initial point in understanding the social incorporation of archaeological research results and knowledge is the great chain of being, a special European form of understanding time as linear-progressive and in terms of continuity. This conception of time is distinguishable from cyclical time concepts used in other societies. Thereby we must consider that on the individual level, as well as within our own social environment, on one side there are numerous different interpretation patterns and readings as to what linear-progressive time is. On the other hand, the cyclical conception of time may still exist, or may be re-invented. Nevertheless, in the western world linear-progressive time conceptions are the main, widely accepted trend. The chief reason for this is that it is scientifically verifiable via the physical sciences, geology, biology and archaeology[11] and it has demonstrated its suitability for daily use.

Seemingly, the main influence of linear-progressive time conception derives since its introduction from the theory of evolution, because of its increasing use within metaphysical reflexion and speculation. In this context, Angehrn (1996:305), in view of the interdependence of mythological and historical thinking, recognises a reshaping of historical thinking through assumptions based on a teleologically oriented philosophy of history, which he labels as a prototype of a fatalistic interpretation of the world.

Basically his statement emphasizes a process that began in medieval times and has expanded since mid 18th century, in the course of which divine predestination is replaced by a concept of development that runs through the course of history.

In this context, the aim of cultural evolution still preserves the perception that development leads from a starting point to a better goal (Ickerodt 2004a:42f. s.a. Ickerodt 2005b; 2006.)[12]. In this way Angehrn expounds the problems of a sub-

[10] "Mission to Mars" (USA 2000).

[11] For a systematic classification of human concepts of time, see Ickerodt (2004a).

[12] This notion did not remain unchallenged. As an example, J. G. Herder refers in his "Auch eine Philosophie der Geschichte zur Bildung der Menschheit" (1774) to this topic and criticizes expedient progress and cumulating enlightenment as principles of history.

liminal continuation of former transcendentally oriented teleological thinking, which in early modern history and in modernity were seemingly abandoned in favour of the benefit of a scientifically based teleonoumus concept. On a meta-level, teleological concepts of history are still valid[13].

Finally, the teleological fundamentals of the European conception of history in the 18th century, developed for example by Johann Gottfried Herder (1744-1803), or in the 19th century for example by the social Darwinist Herbert Spencer (1820-1903) or the evolutionists Lewis Henry Morgan (1818-1881) and Sir Edward Burnett Tylor (1832-1917), are still extremely valid, although they may currently appear in different shapes or forms. At the core of such a meta-narration based on teleology are concepts of society and values referring to an unilinear form of evolution which may be characterized in terms of progress thinking, secularization and rationalism as well as individualism and political self-determination. Indeed, these values have to be seen in combination with, and/or complementary to, chauvinism, which sought for self-legitimation within teleological concepts of history and which have been slowly abandoned only in recent years (racism, political emancipation, decolonization etc.).

This process of changing social values has to be seen as part of a massive and permanent process of social and economic restructuring and reorientation. At the beginning of the 19th century, about 75% of the working population were employed in agriculture, and today it is not even as much as 5%. The rapidly expanding service and information sectors, with their specific needs, have long ago superseded industry as source of livelihood in urban and globalised post-war post-modern society. As a result of this process, traditional, transcendentally legitimated values are beginning to be lost. They are compensated by values that draw their legitimation from scientific arguments. Here, it is crucial to understand that this change in values takes place on an visible level, while the metaphysical level remains unconsidered.

An important conceptional and integratively operating precondition of this economic and social process of reorientation is chronological thinking, which has been emerging since the Middle Ages. It is based on a growing public acceptance of the concept of linear-progressive time and a better understanding of interaction chains as a predominant form of time perception (Ickerodt 2004a:76-84). This concept of linear-progressive time should and may help a highly mobile society to synchronize social and economic behaviour. For this, society needs to develop appropriate structures, such as the big narrative, which is propagated by means of pictures and metaphors.

4.1 Development pathways – the past is the key to the future

If a visitor walks along a time path, as in Raddusch, Mettmann or Hanover, he will, apart from other possible interpretations and based on socially anchored a-priori assumptions, comprehend his own social and technological progress: He himself constitutes the momentary endpoint of his own cultural and historical development and represents the dominant present on the development pathway.

[13] The most important theoretical influences are the 2nd Law of Thermodynamics and the theory of evolution, while the inherent consequences of the philosophy of history never found a broad reception within the humanities (Ickerodt 2004a; 2004b; 2005b; 2006.).

This interpretation is learned throughout one's own life-history and is connected to social grouping dependencies and to one's own experiences (Ickerodt 2004a). It is used in different forms and modes for social self-assurance and provides social identity.

The best example is the original site at the Neanderthal Museum at Mettmann and the "space-time axis" (Raum-Zeit-Achse) development path, which provides the visitor with an understanding of chronology. The end of the pathway is marked by a plate with the sentence: "Today, you look back" (Heute schauen Sie zurück). While looking back from this endpoint one can read a list of historical events: 2000 human genes are sequenced, 1989 first mobile phone, 1969 first moon landing, 1946 first computer, 1938 first nuclear fission, 1924 first television, 1901 first motor-driven flight, 1886 first automobile, 1859 Darwin's theory of evolution, 1856 Fuhlrott discovers the remains of Neanderthal man, 1830 invention of the steam engine, 1510 Copernicus put the sun in the middle of the planetary system, 1450 Gutenberg invents printing, 1119 foundation of the University of Bologna, 800 coronation of Charlemagne, 410 the sacking of Rome by Western Goths, 0 the beginning of the calculation of time[14].

Stress is laid on scientific/technological innovations suggesting goal-oriented evolution to the present position today. Alternatively, some other events in the cultural evolution of mankind might have been chosen, such as the following which have been selected at random, to create a totally different picture of man's cultural evolution, e.g. the Battle of Lechfeld (955), Rousseau's „Du contrat social" (1762), the assault of the Bastille (1789), the Code Civil (1804), the Hambacher feast (1832), the suppression of the Herero uprising (1904), the United Nations Charter (1945), the Tschernobyl disaster (1986) and the European Convention for Protection of National Minorities (1995).

Thereby it has to be taken into consideration that the developer of such a didactical concept has to struggle with a small framework of understanding. He has to fulfil the expectations of the public and to provide a certain sensation of novelty. In the example of the Neanderthal Museum at Mettman, the narrative of accelerating social and technological progress had been chosen. This narrative should provide for the visitor, against the background of the past, a critical or non-critical examination of (1) his origin based on linear-progressive continuity thinking, and of (2) social and cultural change.

A variation of this topic path of evolution can be found at the ErlebnisZoo Hannover. In contrast to the authentic sites of Mettmann and Raddusch, the Hannover Zoo is a scientifically inspired archaeological/historical (i.e. 2b) setting. The way it is understood, as in the case of Mettmann and Raddusch, is clearly defined since the pathway of evolution may be entered at either end.

[14] This same orientation can be seen for the Pleistocene pathway sector: "13,000 years ago first ceramics, 15,000 years ago first arrow heads, 20,000 years ago first needle with eye, 33,000 years ago first cave paintings, 35,000 years ago first appearance of Homo sapiens sapiens in Europe, 40,000 years ago first adornment and 200,000 years ago first appearance of Homo sapiens neanderthalensis in Europe".

Figure 13. At the Erlebniszoo Hannover the visitor can gain an understanding of the biological and cultural evolution of man represented by a pathway on which one can see (left) imitations of the Laetoli footprints, changing uphill to (right) a track of shoe prints leading to a fake excavation (photo by the author).

The uphill trail leads the visitor to the excavation mentioned above. It symbolizes both technological/scientific progress and our preoccupation with our own origins and is a common topic in numerous fictional books and movies. Near the excavation, downhill, one can find the Laetoli footprints (Fig. 3b), explained on an information board. After a short way uphill in the direction of the excavation the footprints turn into a track with shoeprints (Fig. 3a) as well as into the prints of a primate. While the first track leads ahead, the second seems to run (off the main path).

Similarly, in this case scientific/technological progress based on linear-progressive continuity thinking is the major topic. The uphill track is used as a metaphor for unilinear evolution and in this case is combined with the motif of devolution or cultural regression, symbolized by the primate track leading off the main path (Ickerodt 2004a:125-128). Use of this combination of motifs is not only a result of (materialistic) enthusiasm for progress, but also expresses the fear of being a loser in a competitive society.

5 Concluding remarks

It is now almost three decades since archaeological research and its administrative arm, cultural heritage management, began to be aware of the social effects of their work. Towards the end of the 1980s, one became increasingly concerned with the political misuse of archaeology in the Third Reich. This issue made both academic and administrative archaeological circles conscious of the problem of reactivity. In sociology one uses this term to describe the interdependence of so-

ciety and science. This in fact opened up a new field of research for archaeology (Ickerodt 2004a, 2004b).

This step in the direction of a discipline dealing with the sociology of science not only opens up completely new perspectives for archaeological interpretation, since it permits a distinction to be made between social and scientific interpretation patterns or modes. It also represents the first step in a new form of inquiry about the content of our own discipline, which also of course bears on the influence of archaeological research work on the contemporary social environment. In this sense, contemplation of the social dimension of archaeology permits a completely new view of the evolution of archaeology itself: It questions the quality of archaeological interpretation and interpretation patterns and, on the other hand, the feedback relationship between society and the archaeological world.

This new perspective enables the scientific world to distinguish between social and scientific patterns of interpretation and modes of understanding. With it, archaeological research gets a second tool apart from natural science to assure the quality of its own work. It is based on investigating the structural determinism of scientific recognition and interpretation in their historic dimension and in their feedback to both scientific and social environments.

This preoccupation with problems in the field of research history or the history of mentalities confronts the archaeological world with completely new questions. In which ways does archaeological research influence the imparting of social values? How can this process of imparting social values be scientifically validated in a responsible manner?

These are the above mentioned questions dealing with the field of ethics of science that have to be taken into consideration when investigating the social influence of archaeology. To be aware of the dimensions of this research field, as a first step this paper examines the historically evolving reference system "archaeology" as a component of our social identity that has to be outlined.

Therefore, the first section "Founding myth and historical thinking" examined the anthropological basis of our occupation with our own origins. In this context, the close relationship of scientific thinking and metaphysics was emphasized as the cause for the indistinct boundary between these two and for holding a teleologic conception of history. This teleologic concept of history is the big narrative which forms a framework for our perception of the biological and historical evolution of man.

It should not be forgotten that our commitment to know about our origins has an identity constituent and therefore a stabilizing effect on society. This effect results from the fact that dealing with the past has an interpretative and a legitimating functionality, which must explain provenance on one hand and change on the other. It is part of man's ability to adapt. Ickerodt (2004a) illustrated this phenomenon with reference to the image of prehistoric man. On an intrasocial level, it is an appropriate symbol to promote linear-progressive continuity thinking in terms of origins of things and, on the other hand, the image of prehistoric man is a very useful rationale to steer the process of social differentiation on an intrasocial and extrasocial level.

In the next step the research target was defined, i.e. examination of the way archaeological/historical sites in open-air museums, leisure parks and motion pictures are embedded in our understanding of history. As part of the research

strategy, the sites where history is imparted were divided into the two categories, authentic and fictitious sites.

In both cases, "time path" through time were used to "anchor" the sites in history. The layman who is less interested in history can walk along such a time path, thus experiencing the chronological succession beneath his feet. How this works can be understood with the help of the cultural history table in Section 4. We have chosen three examples. Firstly there are the so-called "time plank" of Raddusch and a "time-space axis" near the site in Mettman where the Neandertal remains were found – both represent an authentic historical or heritage landscape. Secondly, in Hanover ErlebnisZoo, an evolution trail incorporating a fictive historical landscape, which shows that archaeological information can be presented to the public independently of the authenticity of an archaeological site or find.

As far as the content of these two examples is concerned, it is clear that they are based on the idea of scientific/technological progress. This idea was developed in its current form in the 19th century as a general metanarration.

This interpretation can be further clarified via the iconographic relationship of the evolution trail or simply by a footprint. In the social perspective, a footprint stands for one's own existence and metaphorically it stands for a goal that has not yet been attained. Over and above this, a footprint is a symbol for the scientific process of evaluation or investigation.

This leads back to the question of how society digests archaeological data, and what significance this process has. It promotes the creation of social identity and it helps to structure and canalize social behaviour. On the basis of the examples shown above, it is possible to depict a scale of values which originates from the typical European mode of thinking in terms of progress. On a metaphysical level, we can see that, in the process of secularisation, traditional concepts and the values and norms based on them are simply "dressed up" into new iconographic pictures. And it must be taken into consideration that, with respect to their metaphysical incorporation, they are a product of a process of adaptation to time.[15] In the sense of Western positivism, these concepts receive their justification and are legitimized by way of general scientific research. Nevertheless it would be incorrect to trace them back to a specific type of understanding, since the possible types of understanding and the resulting capacity to affect the prepared pictures depends on the social environment as well as on one's own perception and utilization.

This condition turns out to be highly problematic for imparting archaeological knowledge, since it doesn't only have an identity-creating effect but also tends to mould mentality. In this spirit I wish to end this paper, which dealt with the social implications of archaeological research, with another quotation from Hobsbawm. On one side it shows that the archaeological community must be both self-reflective and self-critical. On the other hand it clarifies the need for universally implemented archaeological didactics: "So far I have held the opinion that the historian's job, unlike that of a nuclear physicist, cannot do anyone any harm. However, I now know better. Just as the workshops in which the IRA turned fer-

[15] Ickerodt (2006) has developed a kybernetic model to enable this process to be better understood as a standard cycle in an evolutionary process.

tilizer into high explosive, the places where we work can be converted into bomb factories"[16]. (Hobsbawm 1994).

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Appendix 1

Table 1. Archaeological sites, open-air museums, leisure parks and motion pictures as places where an understanding of history is imparted.

	Quality	**1. authentic**		**2. fictitious**	
	Locality and object	**a. original site in situ**	**b. reconstructed**	**a. scientifically proven**	**b. scientifically inspired**
	SCHLESWIG-HOLSTEIN				
1	Archäologisch-Ökologisches Zentrum (AÖZA) Albersdorf, Schleswig-Holstein	archaeological site made accessible	Neolithic settlement and crops		
2	Oldenburger Wallmuseum Oldenburg (Holstein), Schleswig-Holstein		Partly reconstructed Slav settlement		
3	Danewerk and Waldemarsmauer Schleswig, Schleswig-Holstein	archaeological sites made accessible			
4	Haithabu Schleswig, Schleswig-Holstein		Viking age buildings with a protected landscape area		
5	Archaeological hiking trail Ochsenweg Schleswig, Schleswig-Holstein	archaeological sites made accessible			
	MECKLENBURG-HITHER-POMMERANIA				
6	Archäologisches Freilichtmuseum Groß Raden Groß Raden, Mecklenburg-Vorpommern		Slav settlement and sanctuary		
7	Steinzeitdorf Kussow Kussow, Mecklenburg-Vorpommern		Neolithic settlement and crops		
8	Freilichtmuseum „Ukranenland“ Torgelow, Mecklenburg-Vorpommern		Slav settlement and sanctuary		
	LOWER SAXONY				
9	Museumsdorf Cloppenburg Cloppenburg, Niedersachsen		historic buildings gathered together from different areas		

	Quality	**1. authentic**		**2. fictitious**	
	Locality and object	**a. original site in situ**	**b. reconstructed**	**a. scientifically proven**	**b. scientifically inspired**
10	Vorgeschichtspfad Flögeln Flögeln, Niedersachsen	archaeological sites made accessible			
11	neolithic grave Gudendorf, Niedersachsen	archaeological site made accessible			
12	Erlebniszoo Hannover, Niedersachsen			Pathway of Evolution with Laetoli footprints, an archaeological excavation, a prehistoric dwelling and a Neanderthal burial	
13	Archäologisches Zentrum Hitzacker Hitzacker, Niedersachsen		Bronze Age settlement		
14	Museum und Park Kalkriese Kalkriese, Niedersachsen	archaeological site made accessible			
15	Dino Park Münchehagen, Niedersachsen	fossil Dinosaur tracks made accessible	Dinosaurs and prehistoric mammals (partly within their historic environment)	Prehistoric dwelling	
16	Natureum Neuhaus, Niedersachsen		Dinosaurs	two areas with prehistoric dwellings	
17	bronzezeitliches Haus Hahnenkooper-Mühle Rodenkirchen, Niedersachsen		Bronze Age dwelling		
18	Vorgeschichtspfad Sievern Sievern, Niedersachsen	archaeological site made accessible			
19	Erse-Park Uetze, Niedersachsen		Dinosaurs and prehistoric mammals (partly within their historic environment)	Prehistoric people, tents	
20	Torf- und Siedlungsmuseum Wiesmoor, Niedersachsen			Settlement of peatland colonists	

	Quality	**1. authentic**		**2. fictitious**	
	Locality and object	**a. original site in situ**	**b. reconstructed**	**a. scientifically proven**	**b. scientifically inspired**
	SAXONY-ANHALT				
21	Förderverein der Langobardenwerkstadt Zethlingen/ Altmark e.V. Zethlingen, Sachsen-Anhalt		Germanic settlement		
22	Sonnenobservatorium in Goseck Goseck, Sachsen-Anhalt	Excavated archaeological site	So called neolithic observatory		
	BERLIN				
23	Museumsdorf Düppel Berlin, Berlin		Medieval settlement		
	BRANDENBURG				
24	Verein Freilichtmuseum Germanische Siedlung Klein Köris e.v. Klein Köris, Brandenburg		Germanic settlement		
25	Förderverein Slawenburg Raddusch e.V. Raddusch, Brandenburg		Slav fort		
	NORTHRHINE-WESTPHALIA				
26	röm. Kalbrennerei Bad Münstereifel-Iversheim, Nordrhein-Westfalen		Roman limekiln		
27	Freilichtmuseum Sachsenhof Greven-Pentrup, Nordrhein-Westfalen		early Medieval settlement		
28	Museum Haltern Haltern, Nordrhein-Westfalen		Part of the defense of a Roman camp		
29	Köln, Nordrhein-Westfalen	archaeological sites made accessible			
30	Neanderthal Museum Mettmann, Nordrhein-Westfalen	archaeological site made accessible	Pleistocene mammals, art trail		
31	Archäologisches Freilichtmuseum Oerlinghausen, Nordrhein-Westfalen		prehistoric buildings		

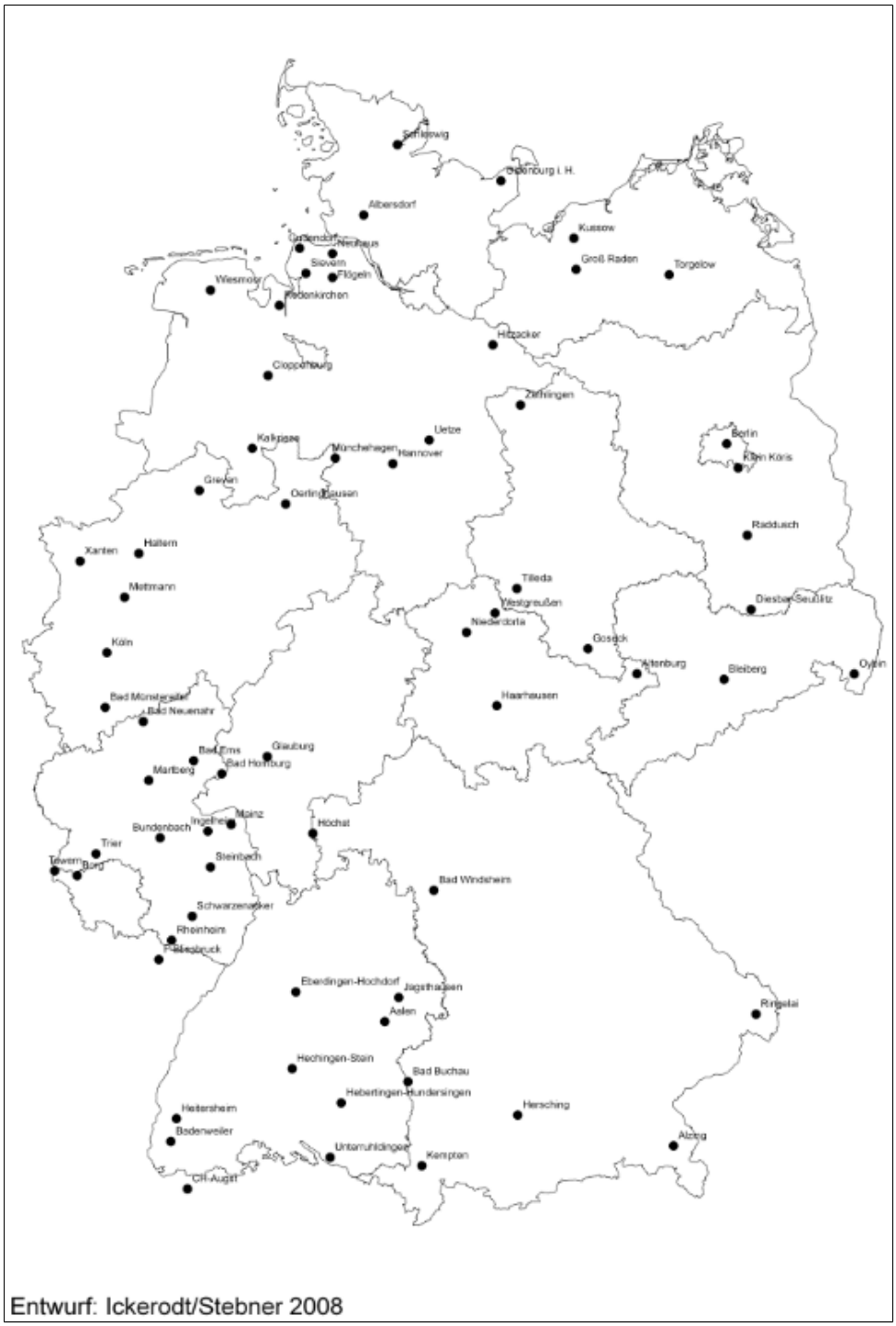
	Quality	**1. authentic**		**2. fictitious**	
	Locality and object	**a. original site in situ**	**b. reconstructed**	**a. scientifically proven**	**b. scientifically inspired**
32	Archäologischer Park/ Regionalmuseum Xanten Xanten, Nordrhein-Westfalen	archaeological site made accessible	Roman settlement		
	RHINELAND-PALATINATE				
33	Limeswachturm Bad Ems, Rheinland-Pfalz		Roman watchtower on the Limes		
34	römische Villa Bad Neuenahr-Ahrweiler, Rheinland-Pfalz	archaeological site made accessible			
35	Europäischer Kulturpark Bliesbrück-Rheinheim Bliesbrück-Rheinheim, Rheinland-Pfalz (Deutschland)/ Frankreich,	archaeological sites made accessible			
36	Römische Villa Borg Borg, Rheinland-Pfalz		Roman villa rustica		
37	Freilichtmuseum Bundenbach Bundenbach, Rheinland-Pfalz		Celtic settlement		
38	Römermuseum Homburg-Schwarzenacker Homburg-Schwarzenacker, Rheinland-Pfalz,	archaeological site made accessible	Roman settlement		
39	Kaiserpfalz Ingelheim Besucherzentrum Ingelheim, Rheinland-Pfalz	archaeological site made accessible			
40	Mainz, Rheinland-Pfalz	archaeological sites made accessible			
41	Martberg (Mons Martis) Martberg, Rheinland-Pfalz		Celto-Roman refuge		
42	Keltendorf Steinbach Steinbach, Rheinland-Pfalz		Celtic settlement		

	Quality	**1. authentic**		**2. fictitious**	
	Locality and object	**a. original site in situ**	**b. reconstructed**	**a. scientifically proven**	**b. scientifically inspired**
43	Gallo-römischer Tempelbezirk Tawern Tawern, Rheinland-Pfalz		Celto-Roman refuge		
44	Trier, Rheinland-Pfalz	arch. site made accessible			
	HESSE				
45	Glauburg-Museum Glauburg, Hessen	arch. site made accessible			
46	Römerkastell Saalburg Bad Homburg, Hessen	arch. site made accessible	Roman castle		
47	Reilichtmuseum Römische villa Haselburg Höchst, Hessen		Roman villa rustica		
	THURINGIA				
48	Versuchsgelände zur experimentellen Archäologie Haarhausen, Thüringen		Roman potter's kiln, Germanic dwellings		
49	Opfermoor Vogtei Niederdorla, Thüringen		Germanic refuge and settlement		
50	Freilichtmuseum Königspfalz Tilleda Tilleda, Thüringen		medieval settlement		
51	Freilichtanlage Funkenburg Westgreußen, Thüringen		Germanic castle		
	SAXONY				
52	Mittelalterliche Bergstadt Bleiberg e.V. Bleiberg, Sachsen		Medieval settlement		
53	Goldkuppe Diesbar-Seußlitz, Sachsen	arch. site made accessible			
54	Burg und Kloster Oybin Oybin, Sachsen	arch. site made accessible			
	BADEN-WÜRTTEMBERG				
55	Limesmuseum Aalen, Baden-Württemberg,	arch. site made accessible	Roman fortification		

	Quality	**1. authentic**		**2. fictitious**	
	Locality and object	**a. original site in situ**	**b. reconstructed**	**a. scientifically proven**	**b. scientifically inspired**
56	Keltisches Oppidum Altenburg, Baden-Württemberg	arch. site made accessible	Reconstructed parts of a Celtic oppidum		
57	Römerbadruine Badenweiler Badenweiler, Baden-Württemberg	arch. site made accessible			
58	Federsee-Museum und ArchäoPark Federsee Bad Buchau, Baden-Württemberg		Neolithic settlement		
59	Keltenmuseum Hochdorf-Enz Eberdingen-Hochdorf, Baden-Württemberg	arch. site made accessible	Celtic buildings		
60	Römisches Freilichtmuseum Hechingen-Stein Hechingen-Stein, Baden-Württemberg	arch. site made accessible	Romain villa rustica		
61	Heuneburgmuseum Herbertingen-Hundersingen, Baden-Württemberg	arch. site made accessible	Celtic prince's seat		
62	Freilichtmuseum Römerbad Jagsthausen, Baden-Württemberg	arch. site made accessible			
63	Pfahlbaumuseum Unteruhldingen Unteruhldingen, Baden-Württemberg		prehistoric lake dwellings		
	BAVARIA				
64	Fränkisches Freilandmuseum Bad Windsheim, Bayern		Medieval buildings		
65	Hersching am Ammersee, Bayern		early Medieval temple		
66	Archäologischer Park Cambodunum Kempten, Bayern	arch. site made accessible	Roman temple area		
67	Mammutheum Scharam/Alzing, Bayern		Stone Age park		
68	Keltendorf Gabreta Ringelai, Bayern		Celtic settlement and fields		

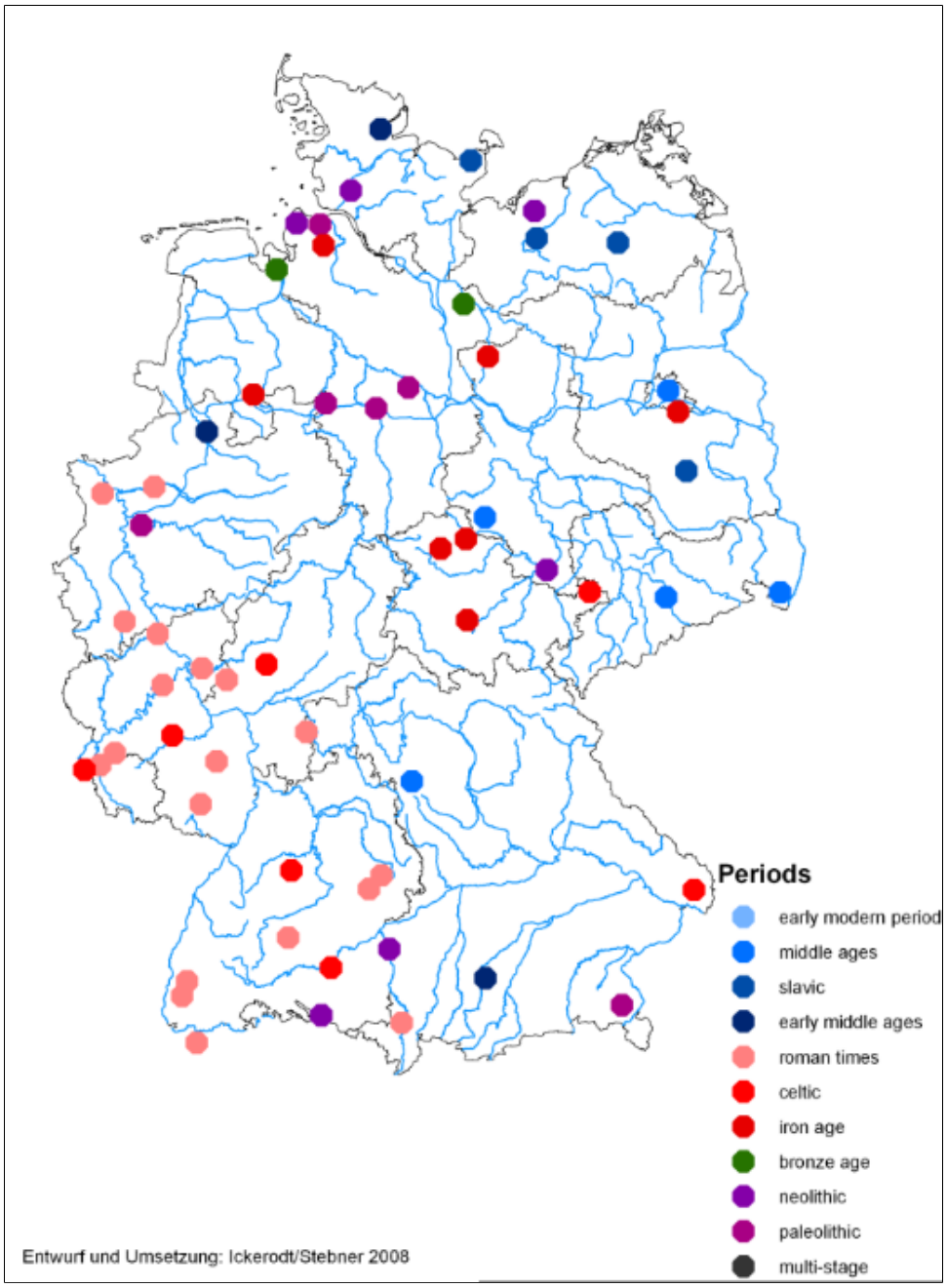
	Quality	**1. authentic**		**2. fictitious**	
	Locality and object	**a. original site in situ**	**b. reconstructed**	**a. scientifically proven**	**b. scientifically inspired**
	SWITZERLAND				
69	römische Siedlung Augst, Schweiz,	arch. site made accessible	Roman settlement		

Appendix 2.



Map of localities listed in Table 1: archaeological sites, open-air museums and leisure parks as places where history is imparted to the public (Draft & map U. Ickerodt, L. Stebner).

Appendix 3.



Map of localities listed in Table 1 maped in relation to the period they reflect.