

# Autonomy in PhD-education – Supervising for Independence

Mattias Borg, Fredrik Kopsch, Torgny Roxå, Paul Stankovski, and Johannes Svensson

**Abstract** — According to the Swedish higher ordinance of education the development of autonomy of PhD students is of high importance. Graduates should be able to formulate new ideas and to independently assess and evaluate scientific results. Therefore it is interesting to investigate how the relationship between student and supervisor impacts the development of autonomy. In this work, we have evaluated the impact of the supervision relationship by a supervisor/student-alignment test (N=25) where both students and their supervisors perform a self-evaluation of the student's level of autonomy and the supervisor's supervision style. The test results show that the autonomy is greater for students with longer experience and also more aligned with the level of autonomy as perceived by their supervisors. The misalignment between the assessment done by students and supervisors decreases with age and time spent as a PhD student. However, we find that the misalignment increases when supervisors have many concurrent PhD students. We observe no statistical differences with respect to gender or nationality.

**Key words** – PhD education; supervisions; autonomy; social bias

## I. INTRODUCTION

Autonomy is one of the most important traits as a successful researcher, allowing for independent thinking, the pursuit of new ideas, and critical scientific evaluation. In an academic context the word *autonomy* however, does not imply “on your own”, it rather entails being critically evaluative towards what is published in the field, as well as towards one's own ideas, and still maintaining a creative edge strong enough to add to the field in a way that is considered new and relevant (Brodin 2015). Becoming an autonomous researcher therefore is to find a balance between two counteracting demands of the field: (1) to be able to adapt to what is seen as accepted knowledge, and (2) the need to through acts of creativity make valid contributions to the field at hand.

A crucial purpose of the PhD education therefore is for the supervisor to develop the level of autonomy in the student. Based on interviews with 14 PhD students, Brodin (2014) discusses how these PhD students strike the balance between the two demands. She reports how students have entered their PhD education with a slightly inflated vision of what it means to do research and to be a researcher. They

foresaw an opportunity to be creative and to find out new things that could benefit the world. What followed was adjustment and diminished creativity. Instead of finding an opportunity to think freely they were overwhelmed by the demands to adapt to established methods and a disciplinary canon, as well as engaging in disciplinary critique. Brodin shows that in order to avoid this critique, the students adjusted their scientific claims towards the mainstream of the field, and they did so to an extent where they started to experience PhD education as adjustment only. At a later stage though, the same PhD students regained their creative voices. They developed a way to make scientific claims with a restricted but still distinct autonomy. In the end, they reclaimed an experience of creativity, however much reduced in comparison to the one anticipated in the beginning of the process. Academic autonomy is in this sense a *controlled autonomy*; to become creative and autonomous but still relevant to the field.

Consequently, and following Brodin (2014; 2015), becoming autonomous, as a researcher, can be understood as a process located between criticality and creativity. Criticality might gain the upper hand and suffocate creativity altogether, but on the other hand too much creativity might result in claims that are considered irrelevant and therefore of little value. This illustrates that doctoral students have a delicate task in finding their personal balance between criticality and creativity. It is equally challenging for supervisors of PhD students: how to supervise towards this aim.

Finding this critique-creativity balance discussed above is not an equal enterprise for all students. To find a relevant creative voice in a critique-filled culture is a matter of social learning. It entails a capacity to “read” the research culture at hand and to figure out why, when, and how a new idea can be offered to the others in order to be considered relevant and valuable. Since this is a social process it is not only the skills of the individual that is important, it also includes consideration of the skills of those who are targeted with such new messages. It is known that social settings both generally and within academia frequently are related to biases due to stereotype threats (Steele 2011).

In any social setting, various assets are considered of greater value than others. Social homophily is a tendency present in

all social settings (McPherson et al. 2001). If the person making a claim is consistent with what is considered normal in the group he/she has an advantage over others who in any way deviates in behaviour, appearance, or background from the established norm (Steele 2011; Huston 2016). Hence, in the delicacy of finding the balance between criticality and creativity in a research environment some doctoral students will have an advantage when they present a new insight to the group.

If the person making a new claim in all respects is similar to those receiving the claim, the reaction as perceived by the person will more easily (1) be attributed to the quality of the claim. If the person making the claim differs from those receiving the claim, reactions can also (2) be attributed to the very fact that the person is different. Therefore, an idea which is nonconforming to the establishment risks being judged as more a-normal (1) + (2) than if the same claim is made by a person closer to what is normal (1) only. It is known (see for example Steele 2011) that it is very difficult for individuals, in the flow of events, to disentangle (1) from (2), and this is the case both for the person making the claim and for those receiving the claim. Thus, PhD students finding themselves being a social minority (inside a majority) in a research group are likely to have a harder time in finding the balance between criticality and creativity.

To explore questions emerging from the above, we have investigated how well aligned 25 PhD student's experiences of supervision are with their respective supervisor's experience. It is assumed that both total alignment as well as too much misalignment is harmful for the development of autonomy. It is further assumed that the degree of experienced misalignment changes over time, as the student becomes socialised into the disciplinary community at hand.

## II. METHOD

The student-supervisor alignment test used was developed by Gurr (2001). It was initially intended as a tool for developing the supervisor-student relation. Here, the test was performed by short interviews with supervisors and their students, conducted separately with the results kept confidential. In total 25 supervisors-student dyads were tested. Each student and supervisor were asked a few questions about their background and were then presented with a two-dimensional empty graph (Appendix A) in which they got to choose a coordinate to represent their relationship. A high value on the  $y$ -axis here means that the student has a high level of autonomy, while a low value means that the student is more dependent on the supervisor. Correspondingly, a high value on the  $x$ -axis means that the supervisor has a very "hands-off" type of supervision style, while a low  $x$ -value means that the supervisor is more "hands-on".

From each dyad of supervisor-student we thus have collected two absolute coordinates and can calculate a distance which can represent the "misalignment" between the two parties. According to Gurr (2001) a large misalignment between the supervisors' supervision style and the students' level of independence can be harmful for their relationship. A "hands-on" supervision style applied to a student which is or at least feels very independent could result in a conflict where the student experience that they are too controlled and hampered in their development of autonomy. On the other hand a "hands-off" type of supervision applied to a student who is very dependent may lead to an experience of neglect. Even though the intentions of the supervisor in this case may be benevolent, the student may feel insecure, pressured and left alone.

We have correlated the misalignment between the data points to several different factors related to supervisor experience, gender and study background. Two particularly relevant questions are how the autonomy of PhD students develops over time, and how the student/supervisor alignment changes as they progress in their work and arguably find their personal balance between criticality and creativity, becoming more accustomed to the academic world. The optimal way to evaluate such development would be to perform the student alignment test for the same set of students/supervisors over a longer period of time, however since this is not possible within the given time frame, we analysed our results based on number of employment years and age.

## III. RESULTS AND DISCUSSION

The total set of absolute coordinates in the supervisor-student alignment test, collected from supervisors and students at LTH, is summarized in Figure 2a. Here each cross represents a supervisor and a triangle represents a student. The arrows in between symbols indicate that the two coordinates belong together, i.e. constitute a supervisor-student dyad. From this graph one can directly discern that most data points lie close to the diagonal going from bottom left to top right of the graph, thus avoiding the upper-left and bottom-right corners in which conflicts may arise (Gurr 2001).

From this complete set of data we have formed sub-groups based on personal information that was also collected from the respondents. To examine the influence of the experience and age of the supervisor we asked for supervisor's years since own PhD and the number of finished PhDs. To investigate whether the overall workload on a supervisor has influence on the supervision, the number of current PhD students was also asked for. Gender aspects were investigated through the determination of supervisor's gender and student's gender. The impact of cultural background

was probed by determining whether the supervisor and student had done their undergraduate studies in Sweden. To observe whether there is an impact of gradual learning throughout the PhD studies, we asked for student's years since employment, and related was also student's age. We have extracted the *misalignment*, defined as the Euclidean distance between each coordinate dyad, i.e.

$$\text{misalignment} = \sqrt{\Delta_{\text{student}}^2 + \Delta_{\text{supervisor}}^2}$$

based on each sub group from the complete data set. The most conclusive is presented below. One-way ANOVA tests have been made to evaluate the statistical significance of the observed trends resulting in p-values that should preferably be low. (The results not shown here can be obtained from the authors.)

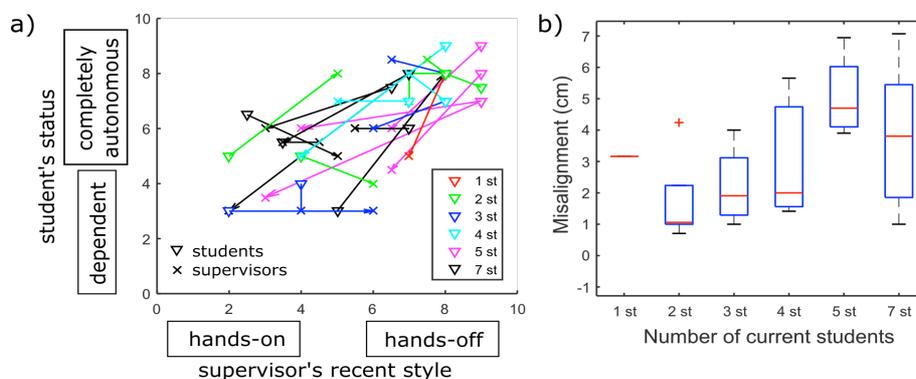
Firstly we investigate the effect of the number of concurrent students that a supervisor has and how that might impact the alignment between supervisor and student. The supervisors in this study have between 1 and 7 students at the same time. In Figure 2b one can see a trend ( $p=0.10$ ) in that supervisors with more concurrent students exhibit greater misalignment between student's and supervisor's opinion of their supervision relationship. This may be understood as an effect of having less time and/or energy available for the supervision of each student. This may result in that the feedback to the individual student suffers, with the risk that the student under- or overestimates his/her work and progress, with potentially negative effects on the student's ability to develop autonomy as a researcher.

Figure 3 displays the data for the subgroups of student years since employment as a PhD-student and student age. These variables are somewhat linked since students tend to age as they progress in their PhD studies. Although the raw data in Figure 3a and d is difficult to interpret, a clear trend can be observed in the extracted misalignment (Figures 3b and 3e). Here we observe that the

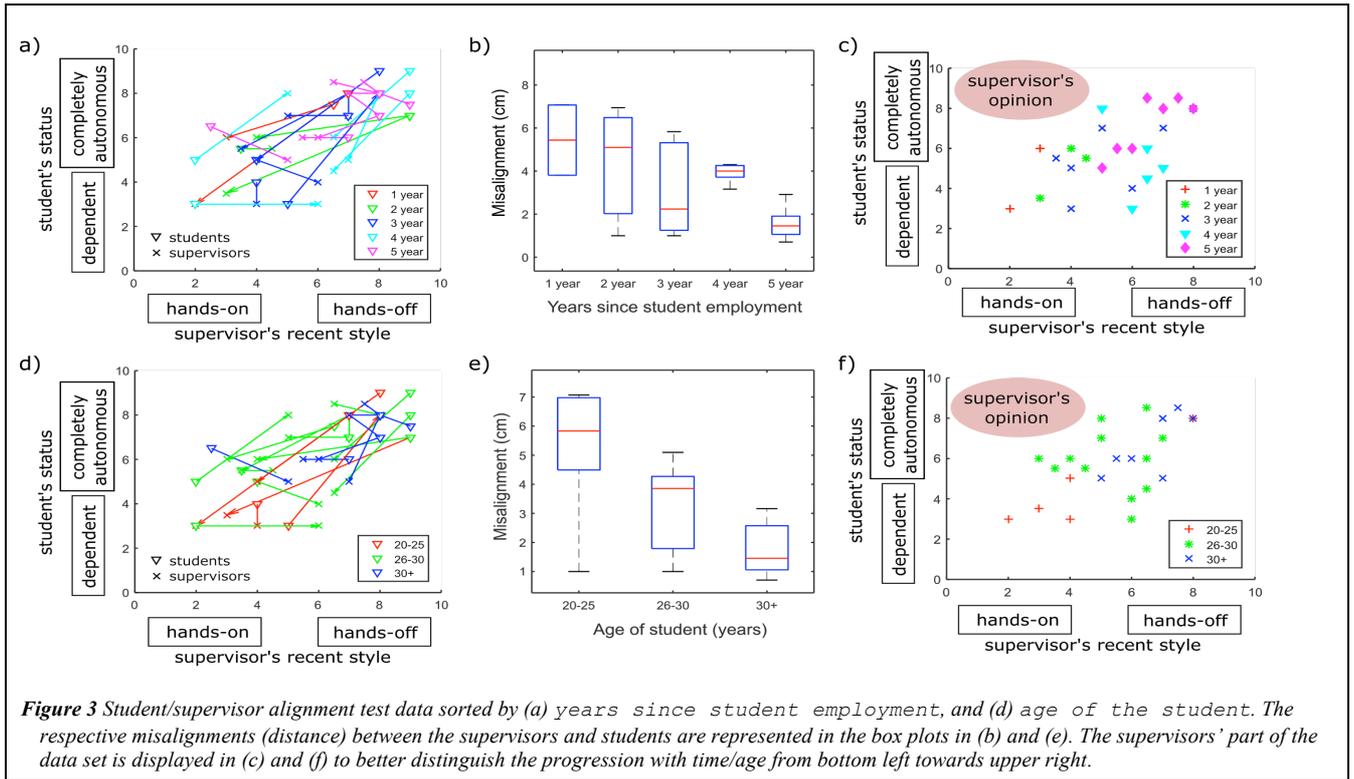
misalignment gradually decreases as the student gains more experience ( $p=0.03$ ) and/or becomes older ( $p=0.07$ ). This may be related to the fact that as the students progress throughout their PhD education (and life), their self-evaluation skills are improved. This misalignment trend could also be explained by that as time passes both supervisors and students obtain a better understanding of the status of their supervision relationship.

Since a goal with the PhD education is to develop the student into autonomous researchers, it is also relevant to study the development of the actual position and not only the misalignment. Under the assumption that the supervisor gives the most reliable evaluation of the supervision relationship, we visualize this by plotting only the supervisor's opinion, as is done in Figures 3c and f. Here the sought-after progression from bottom-left (dependent, hands on) to upper-right (completely autonomous, hands-off) is clearly visible.

As described in the introduction, social homophily is a frequently found trait in workplaces and may strongly influence the interaction between people, for example between supervisor and student. It is thus interesting to study the influence of gender and nationality in the context of autonomy and the supervision relationship.

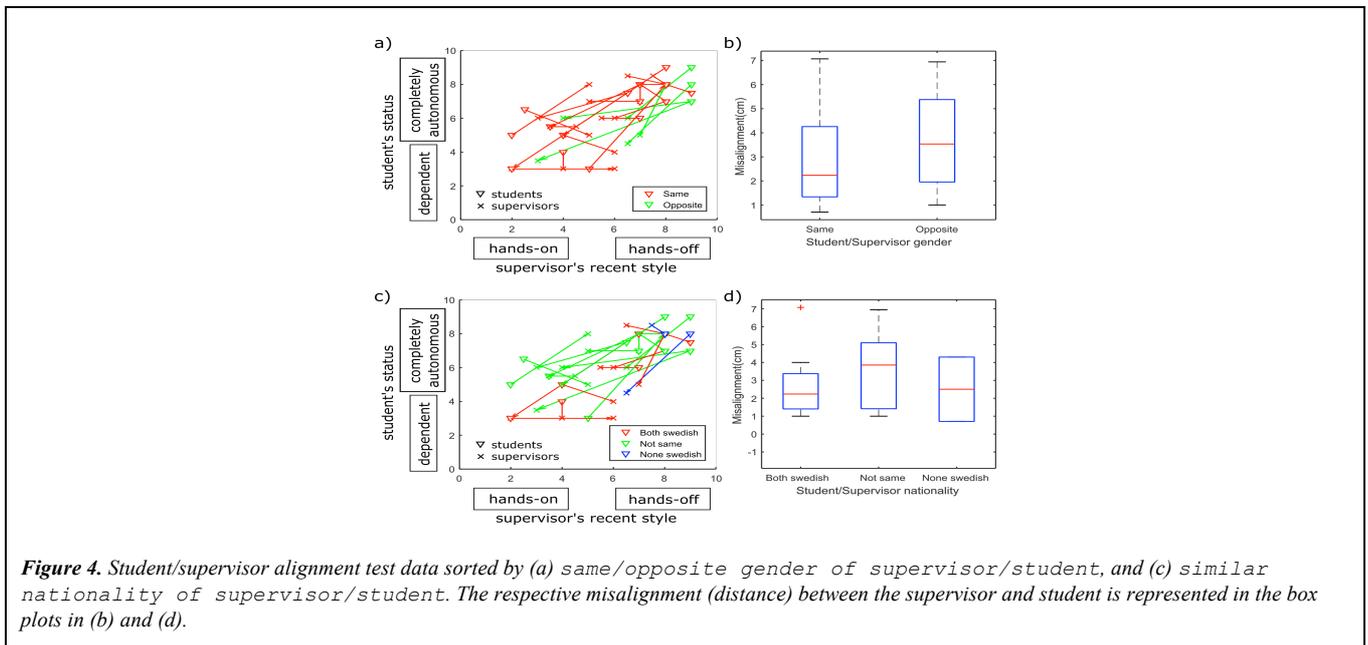


**Figure 2.** Student/supervisor alignment test data sorted by the number of current students. (a) The collected raw data set color-coded such that each color represents a number of current students. The triangles represent the students' part of the data set, while the crosses represent the supervisors' part of the data. The arrows represent the connections between student and supervisor. (b) Misalignment as a function of number of current students.



**Figure 3** Student/supervisor alignment test data sorted by (a) years since student employment, and (d) age of the student. The respective misalignments (distance) between the supervisors and students are represented in the box plots in (b) and (e). The supervisors' part of the data set is displayed in (c) and (f) to better distinguish the progression with time/age from bottom left towards upper right.

In Figure 4 we present the alignment test results sorted in subgroups related to whether supervisor and student have the same gender and nationality (expressed as undergraduate studies in Sweden). The misalignment displayed in (4b) and (4d), respectively, indicate a slightly higher misalignment when the student and supervisor have different gender, and when one has studied in Sweden and the other abroad. However, this difference is not statistically significant to a reasonable degree ( $p=0.31$  for gender and  $p=0.56$  for nationality). A larger sample size would be necessary to clearly evaluate whether such differences actually exist.



**Figure 4.** Student/supervisor alignment test data sorted by (a) same/opposite gender of supervisor/student, and (c) similar nationality of supervisor/student. The respective misalignment (distance) between the supervisor and student is represented in the box plots in (b) and (d).

IV. CONCLUSION

Within the limited scope of the present study we can observe interesting trends. It is positive that the misalignment is generally not large for the student-supervisor. This could be due to that some participants quickly deducted that being far from the line between bottom left and upper right would indicate a problem and therefore adapted their answers accordingly. In addition, a few students did decline to answer the survey, a fact that might hide further misalignment in the entire sample.

However, the study does suggest a number of conclusions.

- Student's autonomy is improved throughout their studies, and the supervision is gradually adapting a more hands-off style of supervision. The development of supervision in the sample is generally following the sought-after diagonal pattern displayed in Figure 2.
- Students appear to learn to self-evaluate themselves better, resulting in a decrease in misalignment between student and supervisor towards the end of the studies. This can be seen as a proxy for an increased ability to navigate in the tension between criticality and creativity, that is for increased autonomy as a researcher.
- Even though small differences in terms of gender and nationality are observed these are not statistically significant.. If not handled wisely, social processes may influence who is considered bright (autonomous) and who is considered average (not autonomous) in a research group. Skilled leaders of research groups may consider this and by various small measures counter such tendencies.
- Misalignment is larger when supervisors have more concurrent students, indicating that having many concurrent students may negatively impact the quality of supervision and subsequently have negative effects on students' ability to develop autonomy.

The development of autonomy of PhD students is an important issue since most careers after graduation both within and outside academia rewards a high level of independence. However, a focus on autonomy can sometimes be lost in the struggle to obtain research results and to develop new fundamental knowledge and methods. Often there is no clear strategy within a research group to support the development of autonomy in students.

We believe that there is a lot to gain from openly discuss autonomy, using for example the "student-supervisor" alignment test as a basis. Even though challenging, research greatly benefits when PhD-students are adequately supported towards autonomy and they thereby become more independent as researchers.

REFERENCES

Berger, P., & Luckmann, T. (1966). *The Social Construction of Reality. A Treatise in the Sociology of Knowledge*. London: Penguin Books.

Brodin, E. (2014). Critical and creative thinking nexus: learning experiences of doctoral students. *Studies in Higher Education, 41*(6), 971 - 989.

Brodin, E. (2015). Conditions for Criticality in Doctoral Education: A Creative Concern. In M. Davies & R. Barnett (Eds.), *The Palgrave Handbook of Critical Thinking in Higher Education* (pp. 265 - 282). New York: Palgrave

Gurr, G. (2001). Negotiating the "Rackety Bridge"—a Dynamic Model for Aligning Supervisory Style with Research Student Development. *Higher Education Research and Development, 20*(1), 81 - 92.

Huston, T. (2016). *How Women Decide – What's True, What's Not, and Why it Matters*. Boston: Oneworld Publications.

Macaskill, A., Taylor, Elissa. (2010). The development of a brief measure of learner autonomy in university students. *Studies in Higher Education, 35* (3), 351-359

McPherson, M., Smith-Lovin, L., & Cook, J. (2001). Birds of a feather: Homophily in Social Networks. *Annual Review of Sociology, 2001*(27), 415 - 444.

Steele, C. M. (2011). *Whistling Vivaldi. How Stereotypes Affect Us and What We Can Do*. Stanford: WW Norton & Co.

I. APPENDIX A - STUDENT ALIGNMENT TEST

**Student alignment test** (Circle your role)

Supervisor: \_\_\_\_\_

Years since PhD: 0-5 6-10 11-20 21-30 31-

Number of finished supervised PhDs (as main supervisor):

0-2 3-5 >6

Number of current PhD students: \_\_\_\_\_

Gender: M F other

Undergraduate (not only MSc) in sweden: yes no

Student: \_\_\_\_\_

Years since employment: 0 1 2 3 4

5

Age: 20-25 26-30 31-

Gender: M F other

Undergraduate (not only MSc) in sweden: yes no

