FROM "HOW GOOD I AM!" TO "FORGIVE ME…PLEASE TRUST ME"- MICROAGGRESSIONS AND ANGLES

Ulrika Ryan

Malmö University

The endeavour of this report is to provide findings on how the normative appreciation of preciseness in mathematical concepts evoke micro-aggressions when students in a linguistically and socially diverse classroom reason about angles in a group activity. Results show that Samir, an emergent Swedish speaker, becomes deprived of reliability and hence loses his chances to make claims of knowledge partly due to the rigidity of (Western) mathematics. The analysed interaction begins with Samir confidently saying "How good I am" when solving a task with his peer Darko. However, it ends with Samir´s ways of talking about himself being completely changed from confidence to insecurity and subordinance, begging Darko to rely on his mathematical knowledge saying "Forgive me…please trust me.".

MATHEMATICAL CONCEPTS AND MICROAGRESSIONS – MAKING THE CONNECTIONS

Mathematical concepts used in formal mathematics are rigid, based on axiomatic conceptions. Their use elicits the normative preciseness of mathematics, an aspect of the Romance of (Western) mathematics (Lakoff & Núñez, 2000) also present in school mathematics. Preciseness and rigidity excludes plastic conceptions of mathematics evoking ideas about mathematics, which often play out as a matter of being right or wrong. Putting forward mathematical claims of knowledge is hence risky business while the chance of being "precisely wrong" is at stake. Being wrong exposes the claimer to potential micro-aggressions from which individuals might become traumatized and eventually stop perceiving themselves as members of mathematical communities (Gutiérrez, 2017). Micro-aggressions are "the everyday verbal, nonverbal, and environmental slights, snubs, or insults, whether intentional or unintentional, that communicate hostile, derogatory, or negative messages to target persons based solely upon their marginalized group membership" (Sue, 2010, p. 3). Marginalized group membership is multiple for an emergent second language speaker while s/he might not be a full member of the linguistic, cultural or/and mathematical community of practice situated in the particular mathematics classroom.

Micro-aggressions operate as micro-assaults, micro-insults or as micro-invalidations enacted as exclusion, nullification or disregarding of a person's beliefs, statements or experiences (Sue, 2010). When participating in reasoning activities together with peers, perpetrations of all three types of micro-aggressions may occur. However, I argue that the preciseness of mathematics in particular may elicit micro-invalidations

2018. In E. Bergqvist, M. Österholm, C. Granberg, & L. Sumpter (Eds.). *Proceedings of the 42nd Conference of the International Group for the Psychology of Mathematics Education* (Vol. 4, pp. 75-82). Umeå, Sweden: PME.

while a person´s statements risk being disregarded and nullified if it cannot be justified in a mathematically precise way. Such micro-invalidations might lead to negative talk and feelings about oneself. Drawing on Wittgenstein's ideas on language games to explore students´ reasoning about angles and talk about themselves, I-language games and the game of giving and asking for reasons are theoretically accounted for below.

I-LANGUAGE GAMES AND THE LANGUAGE GAME OF GIVING AND ASKING FOR REASONS

The notion of I-language games does not raise questions about what "I" am nor what it is to be "me", rather they depart from the question "how do I talk about me?", presupposing that my talk about me "is not one and is not universal for it does not refer to any metaphysical or ontological essentiality. Thus, the discourses about myself are countless because they change constantly. Therefore, the language games in which I use the word 'I' or in which I talk about myself are latticed, interwoven in order to form a whole structure" (Beristain, 2011, p. 107). Based on Wittgenstein´s rejection of reference as the fundamental principle for word meaning, the idea of I-language games dissolves the referential outer(object)-inner(subject) dichotomization of "I" while they are not concerned with what "I" refers to. In fact, Wittgenstein claims that the word "I" do not refer to a person or anything at all. I-language games are not connected to any "metaphysical, internal, private, self-conscious or any psychological mental state" (Beristain, 2011, p. 114). Instead, the use of the word "I" should be understood due to the way we learn to draw attention to ourselves in various language games. The many language games in which the word "I" is explicitly or implicitly used allow for us in understandable ways to share talk which states something about ourselves. It is the *function* of the use of "I" in different contexts that should be stressed, not what it refers to. The function of I-language games "enables a sharable language of our mental/psychological states, experiences, feelings, thoughts" (Beristain, 2011, p. 108). Hence, the study of I-language games allows for drawing attention to students´ ways of sharing experiences and feelings when participating in reasoning activities. Moreover, I-language games show students´ ways of sharing feelings and thoughts about themselves for instance in response to micro-aggressions such as micro-invalidations. Feelings and thoughts, which might lead to stigmatization and eventually perceived marginalized membership in mathematical communities (Guitérrez, 2017).

When students reason in mathematics class their I-language games are latticed with other language games for instance, the *game of giving and asking for reasons* (GoGAR). The GoGAR is at heart of the philosophical theory inferentialism (Brandom, 1994, 2000). Following Wittgenstein´s ideas, concepts are not conferred with meaning due to reference but by their inferential roles in reasoning. The inferential relations of concepts are mostly implicit in concept use, but when unpacking conceptual meaning in the GoGAR they are made explicit. Premises, consequences and incompatibilities that follows from using a concept when making claims form the implicit conceptual relations. For instance, from claiming an angle to be 140° follows implicitly that it is an obtuse angle, that it cannot be for instance 40° and so forth. The

GoGAR is built around to two normative statuses; commitments and entitlements, which emerge in a socially articulated structure of authority and responsibility. When claiming that things are such and such what one does is making a judgement which one undertakes a commitment to and can be held responsible for. One makes a normative stand in putting forward a normative belief. Such a commitment entails not only what is explicitly said but also what follows implicitly form it, i.e. by making a claim one also commits oneself to other normative stands or beliefs, which follow from the original claim. For claims to have normative status they must be normatively appropriate in the social practice they are caught up in. This involves assessment of claims, hence "there must be in play also a notion of entitlement to one's commitments: the sort of entitlement that is in question when we ask whether someone has good reasons for her commitments" (Brandom, 2000, p. 43). An entitlement is a social status that a performance or a commitment has within a community, e.g. a mathematical community and/or a classroom community. Normative assessment of conceptual use implies normative appropriateness as well as normative inappropriateness. From the Romance of mathematics follows a normative appreciation of preciseness, which shape the assessment of mathematical claims. Inappropriate conceptual claims violate the norms, which guide the use of the concept. Such violation (i.e. lack of entitlement to a claim) calls for some kind of sanction which "need not consist in external sanctions" (Brandom, 1994, p. 179-180) suggesting that sanctions can be internal as well as external. External sanctions like exclusion, nullification or disregarding of a person's beliefs or statements are micro-invalidations, i.e. as a kind of micro-aggression (Sue, 2010). Furthermore, the sanctions might lead to disqualification from counting as eligible to undertake commitments (Brandom, 1994). Hence, a student who fails to give reasons for a claim involving e.g. a mathematical concept which her/his interlocutors asses as inappropriate risks being exposed to external sanction in the form of micro-invalidation due to the failure. Internal sanctions caused by micro-invalidations brought forward by interlocutors, affecting the student´s feeling and emotions about him/herself, can be made explicit in the student´s use of I-language games.

METHODOLOGY

The empirical material used for analysis in the present paper consists in a transcript from a 44-min recorded interaction part of a regular mathematics lesson in a linguistically, socially and culturally diverse grade 5 Swedish-speaking-only classroom located at a suburban school in the south of Sweden. The interaction, which involves four students (Darko (D), Samir (S), Greta (G), Eva (E)), and occasionally their teacher, was recorded when the author of this paper acted as a participant observer in the classroom. However, the author did not engage with the group referred to in this report, but had simply left a recording device at their table. The students were engaging in a pair task drawing angles that the other pair of students were to either measure using a protractor or to judge (not measure) as right angled, obtuse or pointy. In interviews made prior to the interaction Darko, born in Sweden by immigrant parents, claims to speak both Serbian and Swedish at home. Samir, who shared that he arrived from the

Palestine 2.5 years ago is an emergent Swedish speaker who speaks Arabic and Hebrew on daily bases at home. In interviews, Samir says that he is good at mathematics and that he knows more mathematics than his peers. His teacher refers to him as an above average achiever in mathematics. Greta and Eva claim to speak only Swedish at home. Greta is the one in the group who uses most formal school talk. The study follows Swedish ethical guidelines for studies in the social sciences (Vetenskapsrådet, 2002). All students´ names are pseudonyms.

The full excerpt analysed in this paper begins with Samir saying "How good I am!" when engaging with the task on angles. It ends 310 turns later with him saying "Forgive me…please trust me", begging Darko to rely on his mathematical knowledge. The analysis is done by firstly forming initial analytical tools to view the empirical material through, and then allow the emerging results to influence the initial theorization about the looming intertwining of I-language games and sanctions in the GoGARs played in the analysed material iteratively. The analysis is conducted in two steps. Step 1 aims at locating critical points where Samir´s I-language games turn form mainly positive talk about himself to talk that is more of a negative kind. To do so turns that function as I-positive language games such as self-praising, task responsibility distribution, initiative taking actions, instruction giving and making claims of knowledge were assigned a +. Turns that function as I-negative language games such as self-criticism, task responsibility renouncing, initiative obeying actions and making claims of lacking knowledge were assigned with a -. Of course, some of the above given as example of I-negative language games could in fact under different circumstances function as I-positive language games. For instance, to obey someone´s initiative can be an act of solidarity and as such viewed as an I-positive language game. Moreover, refraining from making utterances could be considered a kind of silent I-negative functioning language game. The step 1 analysis quantifies Samir´s turns as either 0 (neither positive nor negative or not part of an I-language game), + or -. The analysis does not aim at providing a particular number of turns assigned 0, + or -, rather it is performed to unveil critical points where positive I-language games characterised by for example "How good I am!", changes for negative ones. To do so Samir´s turns where divided into sections of 10 turns each. (In the excerpts below only Samir´s turns are numbered.) The relationship between + and – marked turns in each section where calculated in percentages out of the total number of + and – marked turns. The 0 marked turns where not taken into account while they do not provide information about the relation or change between + and – I-language games. Should the foci for instance had been the distribution of I-talk also the 0-turns would have to be taken into account. In Step 2 of the analysis, based on the GoGARs foregoing and/or being part of the critical points unveiled in the step 1-analysis, aims at exploring committing and (un)entitling moves in the GoGAR that appears to evoke Samir´s changed I-language games. The questions used in the step 2 analysis are; a) What commitment(s) are Samir attributed?, b) Does he get/lose entitlement to his claims? How? and c) What kind of in(ex)ternal sanctions do Samir´s lost entitlement evoke?

RESULTS

Analysis step 1

As shown in chart 1 below Samir´s I-language games are usually positive. Out of the 14 sections, including 10 of Samir´s turns each, most of them show an emphasis on positive I-language games. The result coincides with interviews made with both Samir and his teacher also showing that Samir usually talks positively about himself when engaging in mathematics.

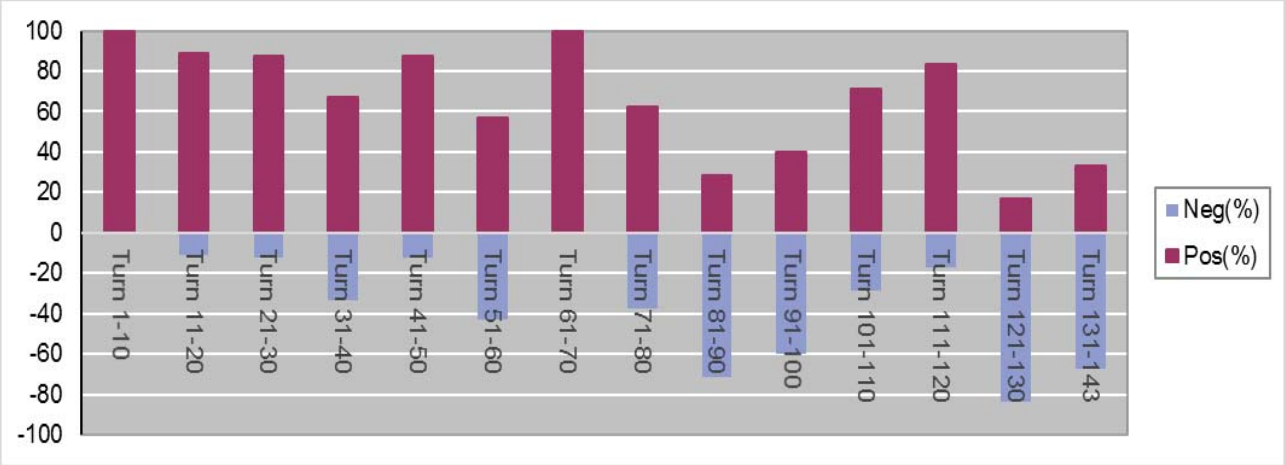

Chart 1: Chart showing the relation between Samir´s positive and negative I-language games. There are 10 of his turns in each bar.

However, at three points in the analysed interaction, turns 51-16, 81-100 and 121-143 Samir´s positive talk about himself is clearly changed, indicating critical events affecting his I-language games.

Analysis step 2

The interaction forgoing the first negative change (in Samir´s turns 51-60) concerns how angles are denoted when using a protractor. Samir taking the lead, he and Darko measured the angles drawn by Greta and Eva and wrote the magnitude on a piece of paper which they handed over to the girls. However, not being fully aware of how to use the scales on a protractor nor finding it normatively inappropriate to denote an angle as 80/100° and another one as 40°/140° (two numbers placed above each other on a protractor scale) that is what they wrote. Greta asks them to give reasons for claiming that the angle is 80/100° and later on also for claiming that the other angle is 40°/140°.

	G:	Yes, but no. It cannot be both [80° AND 100°]
43	S:	Yes, because they are above each other
	G:	Yes, but they…it does not mean that it is the same…it [THE ANGLE] is not 100 slash 80. It must be one of them.
44	S:	Yes, yes…I get it, I made a mistake…where is the protractor…

Samir then uses the protractor to re-measure the angle. He suggests that it is 100° and Darko that it is 80°. Following Darko´s suggestion, Samir writes 80° on the piece of paper. A similar interaction takes place on the behalf of the 40°/140° angle leading to Greta thoroughly giving reasons for claiming that angles are denoted using only one number and explaining how the scales of the protractor works. Though both Samir and Drako initially are committed to claiming the double denunciation, when failing to give normatively appropriate reasons for the claim and thus realizing that they are not entitled to such a claim, Darko tells Samir "Why didn´t you say so.", hence holding Samir responsible for the loss of entitlement to their initial claims. The normative appreciation of mathematical preciseness makes Greta questions the boys´ double denunciation making their entitlement loss explicit and hence exposing them to a micro-invalidation. To avoid in(ex)ternal sanctions Darko places the loss on Samir who alone becomes the victim of the micro-aggression which, in the following turns, changes his I-language games into more negative ones.

In the interaction forgoing and being part of the second negative change in Samir´s I-language games (turns 81-100) the four students are occupied with in pairs drawing one right, one obtuse and one pointy angle that the other pair of students are to judge which is which. Samir takes the lead in deciding on whether he or Darko should draw the right angle ending up with him drawing it. Right after he has finished drawing Greta urges Eva to use the protractor to check that their right angle is exactly 90°. The excerpt below consists in the turns that follow Greta asking Eva to measure their right angle.

	D:	Well done…What degrees is it [THE RIGHT ANGLE THAT SAMIR DREW]
83	S:	It is…eh eh I am good at forgetting.
	D:	Mmm…yes you are good at forgetting.
84	S:	Yes, that is why my name is Forgetty.

Probably inspired by Greta urging Eva to measure their right angle, Darko wants Samir to do the same thing, i.e. he wants Samir to undertake a claim of their angle being exactly 90°. In turn 83 Samir is just about to do that by starting to say "It is…" but appears to change his mind and claims instead to be "good at forgetting". It seems as though Samir tries to avoid being held responsible for a claim about the angle being precisely right which might (like in the first negative change) cause him losing entitlements to that claim and thus expose him to micro-invalidations. To avoid such exposure and its potential following sanctions, he appears to start playing negative I-language games. Hence, Samir rather plays negative I-language games than expose himself to potential micro-invalidations. This I find to be an example of the power that micro-invalidations caused by the normative appreciation of mathematical preciseness holds over students' feelings and thoughts about themselves when engaging in mathematics.

The negative change in Samir´s turns 121-134 occurs when the students are measuring and denoting each other's right, obtuse and pointy angles though that was not the teacher's intention. The boys are faced with using the protractor and measuring angles and again Greta challenges their claims about the magnitude of the measured angles. Playing the GoGAR with Greta on whether to denote an angle as 145° or 155° Samir claims it being 155°, a claim which Darko supports in the first turn. The excerpt below shows the last parts of the interaction.

D: Wait [TO GRETA]…look it *is* 155.

G: Not 55. 55 is there [SHOWING ON THE PROTRACTOR]…this is 45.

132 S: I thought it was…

D: I am not going to trust you anymore.

133 S: I thought it was so…

D: You cannot just think so.

134 S: May I…

D: I asked you specifically and you just said yes.

135 S: Forgive me…please trust me.

Initially Darko undertakes Samir´s claim of denoting the angle 155° and uses it when trying to convince Greta to undertake the same claim. However, she finds it normatively inappropriate and hence challenge it, justifying her own claim by showing Samir and Darko where on the scale of the protractor 145° and 155° respectively are located. Samir appears to undertake Selma´s claim and simultaneously states that his initial claim was based on that he "thought it was" a normatively appropriate claim of knowledge. To avoid being exposed to sanctions due to a possible lack of entitlement for claiming the angle to be 155° Darko (who also undertook that claim) dismisses Samir´s claim and seems to argue that "think so" is not enough to justify a claim, hence challenging Samir´s reliability. In Samir´s 134th turn, he asks Darko´s permission for something but he does not complete his saying. In the last turn Samir appears to think that his reliability and thus possibility of making claims that will earn entitlements is lost and he begs Darko to forgive him and to reassign him reliability. As shown in chart 1 above Samir´s last turns of the interaction include the least amount of positive I-language games. This indicates that the micro-aggressions caused by the normative appreciation of preciseness in mathematics which he has been exposed to has caused changes in the way he uses I-language games to share his "mental/psychological states, experiences, feelings, thoughts" (Beristain, 2011, p. 108) that significantly differs from his usual way of thinking and feeling about himself when engaging in mathematics.

CONCLUDING REMARKS

This report shows how the normative appreciation of mathematical preciseness inherent in conceptions of angles and the artefacts used to measure and denote them impact the students´ reasoning evoking micro-aggressions directed towards Samir, an emergent speaker of Swedish. Not only does the exposure to micro-aggressions but

also such potential exposure, change Samir´s usually positive ways of talking, thinking and feeling about himself when engaging with mathematics, for negative ones. The students in this report do not to explore alternative ways of denoting angles nor do they explore each other's conceptions of and ways of talking about angles, rather they are in the pursuit of preciseness. A normative space of mathematical reasons that appreciate preciseness, does not allow Samir or the other students to give imprecise and/or inappropriate reasons that they can elaborate on when playing the GoGAR. Rather, it is hindering their engagement in GoGARs that would allow for more plastic conceptions and ways of talking about angles and their denotations. The normative space of mathematical reasons elicits epistemological invalidations and hence epistemological micro-aggressions, causing Samir´s talk and feelings of being a forgetter, a wrong-doer and a person without reliability. For an emergent speaker of a second language to engage in mathematical reasoning activities in a Swedish-only classroom where preciseness guides the interlocutors´ reasoning appears to be particularly risky business while her/his resources underpinning giving reasons for claims are diminished by mono-lingual, mono-cultural and mono-mathematical normativity. When inviting students to group activities involving reasoning, educators need to be sensitive to the exposed situation of emergent second language speakers and provide student awareness on potential micro-aggressions evoked by the normative appreciation of mathematical preciseness. At stake are the replacement of positive feelings about oneself when doing mathematics in exchange for feelings and thoughts of sub-ordinance and marginalized membership of mathematical communities.

References

Beristain, C.B. (2011). Language games and the latticed discourses of myself. In Gálvez, J. P., & Gaffal, M. (Eds.), *Forms of Life and Language Games* (pp. 107-119). Walter de Gruyter.

Brandom, R. (1994). *Making it explicit: reasoning, representing, and discursive commitment.* Cambridge, MA, USA: Harvard University Press.

Brandom, R. (2000). *Articulating Reasons.* Cambridge, MA, USA: Harvard University Press.

Gutiérrez, R. (2017). Political conocimiento for teaching mathematics. In Kastberg, S., Tyminski, A. M., Lischka, A., & Sanchez, W. (Eds.), *Building Support for Scholarly Practices in Mathematics Methods* (pp. 11-37): Charlotte: Information Age Publishing.

Lakoff, G., & Núñez, R. (2000). *Where mathematics comes from: how the embodied mind brings mathematics into being.* New York: Basic Books, cop. 2000.

Sue, D. W. (2010). Microaggressions, marginality, and oppression: An introduction. In D. W. Sue (Ed.), *Microaggressions and marginality: Manifestation, dynamics, and impact* (pp. 3–24). New York, NY: Wiley & Sons.