

Stereotype threat among students with disabilities: the importance of the evaluative context on their cognitive performance

Caroline Desombre¹ · Souad Anegmar² · Gérald Delelis³

Received: 10 September 2015 / Accepted: 27 December 2016 /
Published online: 11 January 2017

© Instituto Superior de Psicologia Aplicada, Lisboa, Portugal and Springer Science+Business Media Dordrecht 2017

Abstract This study investigated the hypothesis that cognitive performance of students with physical disabilities may be influenced by the evaluators' identity. Students with or without a physical disability completed a logic test and were informed that they would be evaluated by students from their own group (ingroup condition) or from an other group (outgroup condition). When they had been informed they would be evaluated by students in the outgroup (i.e., students without disabilities), students with physical disabilities had a worse performance than all other participants. Findings are discussed in relation to stereotype threat and its consequences in academic contexts.

Keywords Stereotype threat · Disability · Education · Performance

In France, physical disability is the most prevalent disability among university students. Many efforts have been made in the universities to include students with disabilities (Ebersold 2003). However, people with physical disabilities remain numerically underrepresented in the

✉ Caroline Desombre
caroline.desombre@espe-lnf.fr

Souad Anegmar
souad.anegmar@univ-lille3.fr

Gérald Delelis
gerald.delelis@univ-lille3.fr

¹ ESPE Lille Nord de France and Univ. Lille, EA 4072 - PSITEC - Psychologie : Interactions, Temps, Émotions, Cognition, F-59000 Lille, France

² Univ. Lille, EA 4072 - PSITEC - Psychologie : Interactions, Temps, Émotions, Cognition, F-59000 Lille, France

³ Univ. Lille, SCALAB, UMR 9193 (CNRS, Univ Lille), Villeneuve-d'Ascq, France

universities compared to their numbers in the general population (Ponticelli and Russ-Eft 2009; Quick et al. 2003; Rohmer and Louvet 2013). Possible consequences of this outnumbered status are visibility and role encapsulation (Kanter 1977) meaning that people with disabilities feel highly visible and are expected to be representative of all the other members of their category.

Individuals with physical disabilities feel stereotyped and a wide range of negative characteristics are attributed to them (Louvet and Rohmer 2010; Louvet et al. 2009). Typical attributes assigned to the individual with a disability are incompetence (Louvet and Rohmer 2010; Louvet et al. 2009), unproductivity or dependency (Popovich et al. 2003; Rohmer and Louvet 2006, 2009; Weinberg 1976), warmth (Fiske et al. 2002; Rohmer and Louvet 2011), and courage (Louvet and Rohmer 2010; Rohmer and Louvet 2011, 2013) independent of the nature of the disability. This lack of competence is not only assigned to people with intellectual disabilities: Individuals with a physical disability are also stereotyped as (intellectually) incompetent (Rohmer and Louvet 2011). This stereotype could help to explain why, in an educational setting, teachers can have less positive attitudes and, in accordance, lower expectations for students with disabilities, and therefore treat them differently than students without disabilities concretizing in this way their (negative) attitudes. For example, teachers' attitudes toward students with disabilities may also be negative toward students with dyslexia (Homstra et al. 2010) or toward students with special educational needs (Markova et al. 2016; Thaver and Lim 2014). In the same way, professional caregivers may have implicit negative attitudes toward children with T21 (En a-Drapeau et al. 2012).

Students with physical disabilities are outnumbered and stigmatized in higher education (Cunah 2015). According to the distinctiveness theory (Brewer 2003; Brewer and Roccas 2001; Leonardelli et al. 2010), minority status forefronts individuals' social identities. For example, Cota and Dion (1986) found that participants in a sex-minority condition reported their sex (that is, their minority social identity) more often than participants under same-sex conditions. In this study, participants were placed in three-person groups. The composition of the groups was based on several conditions: all men, all women, lone man (one man with two women), and lone woman (one woman with two men). Participants were then asked to answer to two open-ended probes: "Tell me about yourself" and "Tell me what you are not." In the minority sex condition, in which gender was distinctive, participants mentioned more often their own gender in response to the affirmation self-concept probe than participants in the other conditions, in which gender was not distinctive.

Being numerically underrepresented in a group makes individuals who are negatively stereotyped vulnerable to stereotype threat (Beaton et al. 2007; Inzlicht and Ben-Zeev 2000; Lee and Nass 2012). In other words, social identity distinctiveness increases stereotype threat. According to Steele (1997), stereotype threat

is a situational threat—a threat in the air—that, in general form, can affect the members of any group about whom a negative stereotype exists (e.g., skateboarders, older adults, White men, gang members). Where bad stereotypes about these groups apply, members of these groups can fear being reduced to that stereotype (p. 614).

As a consequence, individuals perform worse when a relevant stereotype or stigmatized social identity is made salient in the performance situation (Schmader and Johns 2003; Schmader et al. 2008).

The seminal work of Steele and Aronson (1995) examined stereotype threat on a group whose abilities are negatively stereotyped in intellectual domains: African Americans. Black

and white college students were asked to complete a difficult verbal test. In the stereotype threat condition, participants were informed that this test could reveal their intellectual aptitudes in the fields of reading and verbal reasoning. In the non-stereotype threat condition, participants were told that the test was a laboratory exercise unrelated to ability. The authors predicted and showed that the black participants performed worse than the white participants when the test was presented as a measure of their intellectual ability; however, when it was presented as non-diagnostic, the performances of black and white participants did not differ. According to Steele and Aronson, the observed decrease in the performances is due to motivational factors such as anxiety (Osborne 2001), fear of confirming the stereotype that is associated with the group membership (Ben-Zeev et al. 2005), and/or cognitive factors such as allocation of attention and resources to processes that are generally automatic (Beilock et al. 2006; Beilock et al. 2007; Schmader and Johns 2003).

Stereotype threat has been demonstrated for several groups and in various fields and domains. For example, this threat appears for girls and math abilities (Désert and Leyens 2002; Shih et al. 1999; Spencer et al. 1999), students from low socioeconomic backgrounds and intellectual ability (Croizet and Claire 1998), French-Arab students and verbal intellectual performance (Chateignier et al. 2009), men and affective information processing (Leyens et al. 2000), German preservice teachers and cognitive ability (Ihme and Moller 2015), and French children attending adapted courses and memory task performance (Berjot et al. 2015). In this last study, after having checked that a negative reputation is associated with students attending adapted classes from elementary schools, Berjot and her colleagues tested the effects of stereotype threat on the performance of students from regular or adapted classes (from 2nd and 4th grades). The results showed that students from adapted classes performed worse than students from regular classes in the threatening condition. In the non-threatening condition, no differences in the performance emerged. Students attending adapted courses are generally oriented on the basis of their learning difficulties: This study showed that “the problem is not so much students’ abilities level, but rather the way the task is presented” (Berjot et al. 2015, p. 153). Although stereotype threat is generally viewed as a situational threat, numerous individual factors moderate its effects such as group identification (Aronson et al. 1999; Bergeron et al. 2006; Kiefer and Sekaquaptewa 2007), domain identification (Aronson et al. 1999, study 2; Leyens et al. 2000), stigma consciousness (Brown and Pinel 2003; Sekaquaptewa and Thomson, 2003), or stereotype internalization (Bonnot and Croizet 2007; Schmader et al. 2004, study 2).

Some authors argued that there is a misrepresentation of the strength and robustness of the stereotype threat effect (Stoet and Geary 2012). Nevertheless, many reviews and meta-analysis confirmed the robust mean stereotype threat but failed to demonstrate the moderating effect of different variables (Doyle and Voyer 2016; Flore and Wicherts 2015; Lamont et al. 2015; Nguyen and Ryan 2008; Picho et al. 2013; Régner et al. 2015). For example, none of the variables (difficulty, presence of boys, type of control group, and cross-cultural gender equality) explored by Flore and Wicherts (2015) in their meta-analysis significantly moderated the effect of stereotype threat for schoolgirls (under 18 years) on math, science, and spatial skills (MSSS) tests. In the same way, Picho and her colleagues (2013) failed to show a significant moderating effect of stereotype priming (either explicit or implicit), group composition (single sex, mixed sex), and regional localization of study on mathematics performance. This lack of moderation may be due to the diversity of the means used to manipulate stereotype threat and situational factors (Nguyen and Ryan 2008; Picho et al. 2013; Shapiro and Neuberg 2007). According to Shapiro and Neuberg and the multi-threat framework, distinct stereotype threats may arise from the intersection of two dimensions: the target of the threat (the self or one’s group) and the source of the threat (the self, outgroup others, or ingroup others). Shapiro and Neuberg (2007) argued that these threats may be elicited by different conditions and

moderators and are mediated by different processes (see also Pennington et al. 2016). Thus, distinct forms of stereotype threats operate on particular individuals in particular contexts.

Contextual factors or other situational elements are therefore of high importance for the emergence of a stereotype threat effect (Logel et al. 2009; Picho et al. 2013). Indeed, stereotype threat depends on both the specific circumstances and the social interaction dynamics. For example, the minority/majority sex conditions have implications on the cognitive performance (Psaltis 2012; Psaltis and Duveen 2006): under certain conditions, girls perform worse in opposite-sex dyads than in same-sex dyads. This impact of the context of interaction on the girls is probably linked with status differences (Psaltis and Duveen 2006). Several studies (Huguet and Régner 2009; Inzlicht and Ben-Zeev 2000; Logel et al. 2009; Lord and Saenz 1985; Sekaquaptewa and Thompson 2002, 2003) examined how cues in the social environment trigger stereotype threat, for example, men's sexism during the interaction (Logel et al. 2009), coercion contexts (Lee and Nass 2012), or numerical representation (Beaton et al. 2007; Huguet and Régner 2009; Inzlicht and Ben-Zeev 2000; Lord and Saenz 1985; Sekaquaptewa and Thompson 2002, 2003). Beaton and collaborators (2007, study 1) found that the sex composition of a team can affect the mathematical performance of women. They showed that women in a solo condition performed worse than women in a non-solo condition. In the same way, Inzlicht and Ben-Zeev (2000) invited participants to complete a difficult math test in triads comprising two individuals of the same sex or two individuals of the opposite sex. Women who were outnumbered by men showed performance decrements in the math test compared to women who were in a gender-homogeneous environment. Men performed equally well in both conditions. The performance drop for women is linked to a stereotype about their group's poor math abilities and poor math competence.

Stereotype threat and associated effects on performance were therefore shown with different groups. The present study is an attempt to extend these results to students with disabilities and to deepen the understanding of the stereotype threat phenomenon, in particular the impact of the context on performances. This is a societal question as, in most academic or professional evaluations, it is quite implicit that the evaluator does not suffer from a physical disability. The poor performance of students or job candidates with disabilities could reflect a stereotype effect. The objective of this study is to investigate the effect of the composition of a group of evaluators on students' performances. We hypothesized that students with physical disabilities would be threatened when they believe that their evaluators do not have physical disabilities. Thus, we predicted that students with physical disabilities in outgroup condition (i.e., thinking that they would be evaluated by students without disabilities) would underperform compared to students with physical disabilities in the ingroup condition (i.e., when they think they will be evaluated by students with disabilities). We expected that students without disabilities would be unaffected by the kind of evaluators (ingroup or outgroup conditions).

Method

Participants

The study comprised 48 French university students aged from 19 to 35 years ($M=23.00$, $SD=3.59$) who volunteered to participate without compensation. All participants studied humanities and social sciences except psychology (40 undergraduate students, seven graduate students, and one PhD student). Twenty-four had a physical disability (11 women, 13 men, M

$age=24.33$, $SD=3.33$) and 24 did not (13 women, 11 men, $M\ age=22.25$, $SD=3.54$). All signed a consent form and all were included in the sample. The disabilities were of the lower extremities without intellectual disability (for example, people in a wheelchair after an accident, one student with *spina bifida* without cognitive consequence, or those who had had a prenatal infection). Thus, a pencil and paper task was not problematic, and potential participants were reassured about that.

Material and procedure

The participants were tested individually in the lab. We informed them that they would fill out a questionnaire and then complete a test customarily used in universities. This test was presented as a “measure of logic skills and general school performance.” The participants were chronologically informed that “while you will complete these tasks, you will be filmed,” “the video recording as well as your answers will be evaluated by five students,” “when your results have been evaluated, within a week, you will have the possibility to meet the evaluators who will present their evaluations and the results of the test.” Behind the camera, the experimenter said “good, one sees you from head to toe.”

The outgroup or ingroup conditions were then randomly introduced using the identity of the imaginary panel of future evaluators. This panel was presented as coming from various student associations. Participants with disabilities in the outgroup condition were told that they would be evaluated by five members of the “Association of Students in Psychology” (i.e., students assumed to be without disabilities). Those in the ingroup condition were told that they would be evaluated by five members of the “Association of Students with Disabilities” (i.e., students with disabilities). For participants without disabilities, the associations establishing ingroup and outgroup conditions were inverted. They then filled out a 4-item questionnaire on their personal characteristics (size, eye color, hair, and potential specificity especially disabilities), being told that the panel would read their answers before grading the test. The evaluators would therefore presumptively be informed of the disability via the 4-item questionnaire and the videotape.

Participants first filled out the Twenty Statements Test (Kuhn and McPartland 1954), a measure of self-image, in which participants are asked for 20 answers to the simple open-ended question “Who am I?” The participants had 3 min to write their answers, which were used here to rate the potential effects of evaluators’ membership on social categorization. More precisely, this measure was a check of the fact that social identity of “students with physical disabilities” was more salient in the outgroup condition than in the ingroup condition.

As a second task, the participants completed the D-series of the Progressive Matrices (Raven et al. 1998/2003). The Progressive Matrices are a series of multiple-choice items of abstract reasoning (Brouwers et al. 2009). Each item depicts an abstract pattern in a three by three matrices. All cells contain a figure except for the cell in the lower right corner. Participants are asked to identify the missing segment that would best complete the pattern. Correct and incorrect answers were respectively coded 1 and 0. The performance was the sum of correct answers (max score=12). After completing this test, participants were debriefed about the real purpose of the study and thanked for their participation.

This experiment took the form of a 2×2 factorial design. The factors were status of participants, students with disabilities or not, and condition of evaluation, that is, the test was presented as either being evaluated by ingroup members or by outgroup members. The primary dependent variable was the performance in a written “intellectual ability” task. Spontaneous mentions of identity were also recorded.

Results

Preliminary analysis

First, a *t* test showed the absence of gender differences on performance (M men = 9.79, SD = 2.13, M women = 10.08, SD = 2.00), $t(46) = 0.49$, $p = .63$.

Grade and time spent to complete the matrices were regressed on performance. The grade generally tended to influence the performance of the participants, $\beta = -.27$, $p = .06$. We thus compared the grade of the participants (after a numerical coding from 1 (*L1*) to 6 (*PhD student*)) between conditions. We conducted an analysis of variance (ANOVA) with grade as the dependent variable and status and condition as the independent variables. The analysis revealed no main effects for status, $F(1,44) = 1.45$, $p = .23$, or condition, $F(1,44) = 0.16$, $p = .69$. However, a significant status \times condition interaction occurred, $F(1,44) = 5.19$, $p = .03$, $\eta^2_p = .11$. A Fisher's *LSD* post hoc test indicated that in the outgroup condition, students with disabilities ($M = 3.25$, $SD = 1.29$) were more often graduates than students without disabilities ($M = 2.17$, $SD = 0.94$), $t(44) = 2.41$, $p = .02$. There was no difference between students with ($M = 2.42$, $SD = 1.00$) and without disabilities ($M = 2.75$, $SD = 1.06$) in the ingroup condition, $t(44) = .94$, $p = .45$. Grade was thus used as a covariate in all test performance analysis.

Time spent to complete the matrices was not a significant predictor of test performance, $\beta = .20$, $p = .17$.

Manipulation check

The participants gave an average of 8.50 answers ($SD = 2.65$) to the question: "Who am I?" Two judges (who were unaware of the conditions) rated the answers of the participants. These judges were instructed to code each participant for the presence or absence of three categories in the answers: identity in terms of "disabled people group" membership (only for students with physical disabilities), other social identities (gender, student, etc.), and self-identity (size, hair color, etc.). The inter-rater reliability was .98. All disagreements were resolved by the first rater.

Unexpectedly, students with physical disabilities did not significantly mention their disability more often in the outgroup condition (75%) than in the ingroup condition (41.67%, phi-coefficient, $\phi = .34$), $\chi^2(1, N = 24) = 2.74$, $p < .10$. Although this difference could be considered as marginal, it is not sufficient to be sure that our manipulation was successful. This point will be further addressed in the "Discussion" section.¹

¹ We made further analysis on other identities reported. Students with physical disabilities did not differ either in the extent to which they mentioned other social identities (83.33% in the ingroup condition vs 75% in the outgroup condition, phi-coefficient, $\phi = .10$) or self-identity (75% in the ingroup condition vs 50% in the outgroup condition, phi-coefficient, $\phi = .26$), respectively $\chi^2(1, N = 24) = 0.25$, $p = .62$ and $\chi^2(1, N = 24) = 1.60$, $p = .21$. Students without physical disabilities in the ingroup condition did not differ from students without physical disabilities in the outgroup condition either for the report of social identities (75% in the ingroup condition vs 91.67% in the outgroup condition, phi-coefficient, $\phi = .22$) or for the report of self-identity (83.33% in the ingroup condition vs 91.67% in the outgroup condition, phi-coefficient, $\phi = .13$), respectively $\chi^2(1, N = 24) = 1.20$, $p = .27$ and $\chi^2(1, N = 24)$, $p = .54$.

Participants' performance

The performance scores were analyzed by performing a 2 (status) \times 2 (condition) analysis of covariance (ANCOVA) on the number of correct answers, with status and condition as between-participants factors and self-reported grade as a covariate. The analysis showed no significant effect of the covariate, $F(1,43)=0.17, p=.68$.

Our main prediction was that students with physical disabilities would experience stereotype threat that undermines their performance only in situations in which evaluators are outgroup members (i.e., students without disabilities). This prediction is strongly supported by the data. Even if the covariate has no significant effect, the adjusted means were used in the analysis and are presented in Fig. 1.

The analysis revealed indeed a significant status \times conditions interaction, $F(1,43)=15.89, p<.001, \eta^2_p=.27$. In order to test our specific hypotheses, two planned contrasts were conducted between the ingroup and outgroup conditions for students with disabilities and for students without disabilities. Consistent with the hypothesis, students with disabilities in the outgroup condition ($M=7.04, SD=1.65$) correctly completed fewer matrices than students with disabilities in the ingroup condition ($M=10.40, SD=1.00$), $F(1,43)=52.53, p<.0001, \eta^2_p=.55$. Students without disabilities were unaffected by the condition and performed similarly in the ingroup condition ($M=11.51, SD=0.67$) and in the outgroup condition ($M=10.80, SD=0.72$), $F(1,43)=2.39, p=.13$. It should also be noted that students with disabilities performed to a lower level than students without disabilities in both the ingroup condition, $F(1,43)=6.06, p=.02$, and the outgroup condition, $F(1,43)=62.54, p<.01$.

The ANCOVA also revealed a significant condition main effect, $F(1,43)=41.39, p<.001, \eta^2_p=.49$, with participants in outgroup condition ($M=8.92, SD=2.32$) performing worse than participants in ingroup condition ($M=10.96, SD=1.00$) and a significant status main effect, $F(1,43)=57.62, p=.0001, \eta^2_p=.57$ with students with disabilities ($M=8.71, SD=2.20$) performing worse than students without disabilities ($M=11.17, SD=0.76$).

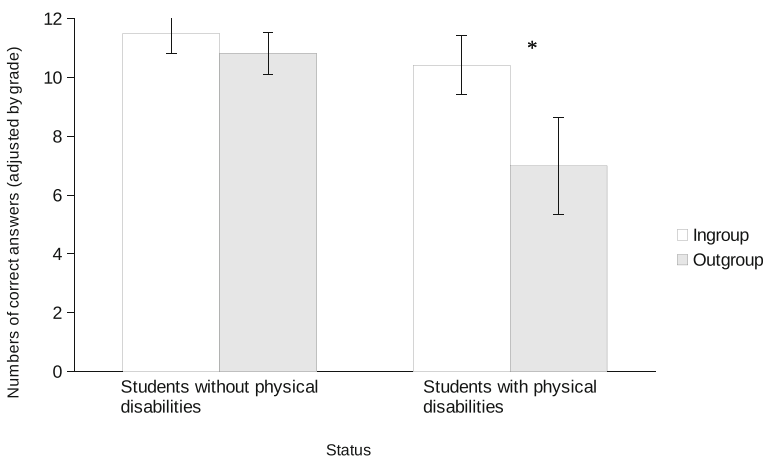


Fig. 1 Mean number of correct answers adjusted by grade (max=12) to the D-series for the participants with or without physical disabilities in the outgroup or ingroup condition (error bars represent ± 1 standard deviation) * Significant difference between Ingroup and Outgroup conditions Note. The analysis showed no significant effect of the covariate, $F(1, 43) = 0.17, p = .68$

Discussion

We predicted that placing students with physical disabilities in an environment in which they anticipate to be being confronted with non-disabled evaluators is sufficient to create a threatening intellectual environment that causes decrements in their intellectual performances. The results strongly support this hypothesis and are consistent with the theoretical frameworks that guided the work (Shih et al. 1999; Steele and Aronson 1995). The main effect for condition (outgroup or ingroup) could lead into thinking that the mere—anticipated—presence or contact with outgroup members is in itself sufficient to decrease cognitive performances. In the same way, the main effect for status (with or without physical disabilities) could lead to seeing people's physical disabilities as an intrinsic factor of decrement in their cognitive performances. However, these effects are qualified by the interaction between both the experimental manipulation and participants' status. This interaction showed not only that students with disabilities perform less than students without disabilities in both contexts but it also showed that the context, as expected, only influenced the performance of students with disabilities. Indeed, students with disabilities in the ingroup context performed less than those in the outgroup context, a difference that did not appear for students without disabilities. However, it is worth noting that the higher scores of the students without disabilities may reflect a ceiling effect that could have masked an effect of the context. Future studies may help to solve this issue even though it is not a core aspect of the present research question.

Regardless of these promising results, it should be acknowledged that the experimental manipulation used here had only a marginal effect on the salience of students' "disabled" identity, implying that results should be read with caution. Nevertheless, the fact that the experimental manipulation also leads to identity threat gives us confidence toward the reliability of the procedure. The marginal result obtained here may more translate a problem in the measure itself (i.e., the "Who am I?" test). As a result and as previously used in the literature, future research may rather use an implicit measure instead of an explicit measure (e.g., lexical decision test, for an example see Thomas and Dubois 2011).

This study shows thus that, as for women or other social groups, stereotype threat on students with physical disabilities can be activated by the mere anticipation of an evaluation by students without disabilities. Students with physical disabilities may be highly concerned about the possibility of confirming negative stereotypes about their group assumed to be held by the students without disabilities. This concern could effectively decrease their cognitive performance (see Beilock et al. 2006; Carver et al. 1979; Duval et al. 1992). In the outgroup condition, the participants with disabilities could be afraid that their performance confirmed in the minds of the evaluators that the negative stereotypes were true and therefore that these evaluators could judge them badly. In sum, the context—in particular the real or anticipated presence of outgroup members—can trigger stereotype threat. According to Shapiro and Neuberg (2007), this threat corresponds to a "threat from outgroup members." These results were obtained from students with physical disabilities. It can be expected that other disabilities such as mental or learning disabilities may be affected by this phenomenon. Furthermore, one can hypothesize that different disabilities (e.g., deafness or blindness) could lead to different effects of a stereotype threat on the individuals' performances because the stereotypes attached to them differ, their visibility differs, and the real or supposed weakness or impairment of the abilities (e.g., attentional, intellectual, emotional, social, and/or motor) also differs.

Furthermore, students with disabilities obtained lower scores than students without physical disabilities even in the absence of a time constraint for completing the matrices. However, the use of a time constraint—as it is often the case for standardized tests or scholastic tasks—could

probably reinforce this discrepancy between the groups because it could constitute an additional pressure for the students with disabilities: doing something well and doing it fast. That second counter-stereotypic element could increase the associative strengths with the category of “disability” (see Dijksterhuis et al. 2000). The effect of time constraint, in itself (versus its absence) on people with disabilities should be tested and could possibly lead to adjustments in the way they are generally evaluated (indeed, for example, French students with disabilities benefit from an added third of time to take their exams).

In several studies (e.g., Wout et al. 2008; Zhang et al. 2013), the authors observed different decrements in performances as a function of the type of threat that is activated. For example, Zhang et al. (2013)’s studies are devoted to two types of threats. In a first pilot study investigating the women’s threat concerns in math, they showed that women reported a greater concern about how gender stereotypes threatened their self-reputation rather than their group-reputation. In a second study, the performance was public in all conditions (the source of the stereotype threat is therefore others in all conditions) but the target of the threat—self or group—was manipulated. In an own name condition, participants were asked to write the date, their real name, and their gender on the cover sheet of a math test booklet. These instructions allowed linkage of the self to the performance. In an identity-masked condition, they were instructed, namely for coding purposes and due to confidentiality concerns, to indicate a fictitious name on each page of the math test. The fictitious name was assigned and could either be male or female. In this condition, participants were thus primed with the idea that the self would not be publicly linked to their performance. The results showed that women in the identity-masked condition had a significantly higher math performance and reported less self-threat and distraction than those in the own name condition. Men were unaffected by this manipulation.

Future studies could thus explore (1) the way a threat could differently affect students with disabilities depending on both the source and the target of this threat and (2) the effect of the types of threats on their performances. These analyses could enable, we think, promising specific programs aiming at preventing stereotype threat effects in students with disabilities in higher education. As Shapiro and Neuberg (2007) pointed out, the threats are elicited by different circumstances, are mediated by different mechanisms, and are moderated by different personal and situational factors. They therefore require qualitatively different interventions. For example, preventing the development of personal negative attitudes and the internalization of the stereotypes will protect against self-as-source stereotype threats (Shapiro and Williams 2012). On the other hand, reducing stigma consciousness will protect against other-as-source stereotype threats. The identification of sources and targets for disabled students in educational setting is important to prevent the effects of stereotype threat and to promote the social inclusion of these students. Programs for inclusive education could be addressed to students with disabilities but not uniquely for them. Other persons, potential sources of threats like students without disabilities, teachers, etc. could also be concerned.

The results of the present study also have important implications for both the classrooms and the workplaces. The proportion of people with a physical disability is low in the general population. The drop in performance in a threatening situation may confirm stereotypes and thus justify their position in our society. It could for example reinforce the idea that individuals with a physical impairment are less competent and less productive than others (Louvet and Rohmer 2010). This study pushes forward the understanding of psychosocial problems related to disability and in particular the academic visible lack of success of individuals with disabilities (see Ponticelli and Russ-Eft 2009; Quick et al. 2003): they are still less represented than others in prestigious education domains and are generally numerically underrepresented in the universities (few achieve a doctoral thesis or even a master’s degree).

We suggest that future studies test the hypothesis that the mere presence of students with physical disabilities and students without is sufficient in itself to decrease the performance of those with disabilities. The right to education, promoted by the United Nations' Convention on the Rights of Disabled Persons, was accepted by most OECD countries. In France, the law n° 2005-102 (2005) that promotes general education for students with disabilities provides the foundations for inclusive schooling. As in other European countries, the proportion of students with disabilities in the academic system continues to gradually increase. This can contribute to gradually reduce the effects of stereotype threat. The recruitment of teachers with disabilities could also, at least partly, mitigate the effects of stereotype threat.

References

- Aronson, J., Lustina, M. J., Good, C., Keough, K., Steele, C. M., & Brown, J. (1999). When white men can't do math: necessary and sufficient factors in stereotype threat. *Journal of Experimental Social Psychology*, *35*, 29–46. doi:10.1006/jesp.1998.1371.
- Beaton, A., Tougas, F., Rinfret, N., Huard, N., & Delisle, M. N. (2007). Strength in numbers? Women and mathematics. *European Journal of Psychology of Education*, *22*, 291–306. doi:10.1007/BF03173427.
- Beilock, S. L., Jellison, W. A., Rydell, R. J., McConnell, A. R., & Carr, T. H. (2006). On the causal mechanisms of stereotype threat: can skills that don't rely heavily on working memory still be threatened? *Personality and Social Psychology Bulletin*, *32*, 1059–1071. doi:10.1177/0146167206288489.
- Beilock, S. L., Rydell, R. J., & McConnell, A. R. (2007). Stereotype threat and working memory: mechanisms, alleviation, and spillover. *Journal of Experimental Psychology: General*, *136*, 256–276. doi:10.1037/0096-3445.136.2.256.
- Ben-Zeev, T., Fein, S., & Inzlicht, M. (2005). Arousal and stereotype threat. *Journal of Experimental Social Psychology*, *41*, 174–181. doi:10.1016/j.jesp.2003.11.007.
- Bergeron, D. M., Block, C. J., & Echtenkamp, B. A. (2006). Disabling the able: stereotype threat and women's work performance. *Human Performance*, *19*, 133–158. doi:10.1207/s15327043hup1902_3.
- Berjot, S., Amoura, C., Bensalah, L., & Herbay, A. (2015). Stereotype threat among children attending adapted courses (7–10 years old): a study in a quasi-ordinary classroom. *Revue Internationale de Psychologie Sociale/International Review of Social Psychology*, *27*, 133–159. RIPSO_273_0133.
- Bonnot, V., & Croizet, J.-C. (2007). Stereotype internalization and women's math performance: the role of interference in working memory. *Journal of Experimental Social Psychology*, *43*, 857–866. doi:10.1016/j.jesp.2006.10.006.
- Brewer, M. B. (2003). Optimal distinctiveness, social identity, and the self. In M. Leary & J. Tangney (Eds.), *Handbook of self and identity* (pp. 480–491). New York, NY: Guilford Press.
- Brewer, M. B., & Roccas, S. (2001). Individual values, social identity, and optimal distinctiveness. In C. Sedikides & M. Brewer (Eds.), *Individual self, relative self, collective self* (pp. 219–237). Philadelphia: Psychology Press.
- Brouwers, S. A., Van de Vijver, F. J. R., & Van Hemert, D. A. (2009). Variation in Raven's Progressive Matrices scores across time and place. *Learning and Individual Differences*, *19*, 330–338. doi:10.1016/j.lindif.2008.10.006.
- Brown, R. P., & Pintel, E. C. (2003). Stigma on my mind: individual differences in the experience of stereotype threat. *Journal of Experimental Social Psychology*, *39*, 626–633. doi:10.1016/S0022-1031(03)00039-8.
- Carver, C. S., Blaney, P. H., & Scheier, M. F. (1979). Focus of attention, chronic expectancy, and responses to a feared stimulus. *Journal of Personality and Social Psychology*, *37*, 1186–1195. doi:10.1037/0022-3514.37.7.1186.
- Chateignier, C., Dutrévis, M., Nugier, A., & Chekroun, P. (2009). French-Arab students and verbal intellectual performance: do they really suffer from a negative intellectual stereotype? *European Journal of Psychology of Education*, *24*, 219–234. doi:10.1007/bf03173013.
- Cota, A. A., & Dion, K. L. (1986). Salience of gender and sex composition of ad-hoc groups: an experimental test of distinctiveness theory. *Journal of Personality and Social Psychology*, *50*, 770–776. doi:10.1037/0022-3514.50.4.770.
- Croizet, J.-C., & Claire, T. (1998). Extending the concept of stereotype threat to social class: the intellectual underperformance of students from low socioeconomic backgrounds. *Personality and Social Psychology Bulletin*, *24*, 588–594. doi:10.1177/0146167298246003.
- Cunnah, W. (2015). Disabled students: identity, inclusion and work-based placements. *Disability & Society*, *30*, 213–226. doi:10.1080/09687599.2014.996282.

- Désert, M., & Leyens, J.-P. (2002). La menace du stéréotype : universelle ? inéluctable ? [Stereotype threat: universal? Inevitable?]. In J.-L. Beauvois, R.-V. Joule, & J.-M. Monteil (Eds.), *Perspectives cognitives et conduites sociales* (Vol. 8, pp. 121–134). Rennes: Presses Universitaires de Rennes.
- Dijksterhuis, A., Aarts, H., Bargh, J. A., & van Knippenberg, A. (2000). On the relation between associative strength and automatic behavior. *Journal of Experimental Social Psychology*, 36, 531–544. doi:10.1006/jesp.2000.1427.
- Doyle, R. A., & Voyer, D. (2016). Stereotype manipulation effects on math and spatial test performance: a meta-analysis. *Learning and Individual Differences*, 47, 103–116. doi:10.1016/j.lindif.2015.12.018.
- Duval, T. S., Duval, V. H., & Mulilis, J.-P. (1992). Effects of self-focus, discrepancy between self and standard, and outcome expectancy favorability on the tendency to match self to standard or to withdraw. *Journal of Personality and Social Psychology*, 62, 340–348. doi:10.1037/0022-3514.62.2.340.
- Ebersold, S. (2003). Inclusion and mainstream education: an equal cooperation system. *European Journal of Special Needs Education*, 27, 89–107. doi:10.1080/0885625032000042339.
- Enéa-Drapeau, C., Carlier, M., & Huguet, P. (2012). Tracking subtle stereotypes of children with trisomy 21: from facial-feature-based to implicit stereotyping. *PLoS One*, 7(4), e34369.
- Fiske, S. T., Cuddy, A. J., Glick, P., & Xu, J. (2002). A model of (often mixed) stereotype content: competence and warmth respectively follow perceived status and competition. *Journal of Personality and Social Psychology*, 82, 878–902. doi:10.1037/0022-3514.82.6.878.
- Flore, P. C., & Wicherts, J. M. (2015). Does stereotype threat influence performance of girls in stereotyped domains? A meta-analysis. *Journal of School Psychology*, 53, 25–44. doi:10.1016/j.jsp.2014.10.002.
- Hornstra, L., Denessen, E., Bakker, J., van den Bergh, L., & Voeten, M. (2010). Teacher attitudes toward dyslexia: effects on teacher expectations and the academic achievement of students with dyslexia. *Journal of Learning Disabilities*, 43, 515–529. doi:10.1177/0022219409355479.
- Huguet, P., & Régner, I. (2009). Counter-stereotypic beliefs in math do not protect school girls from stereotype threat. *Journal of Experimental Social Psychology*, 45, 1024–1027. doi:10.1016/j.jesp.2009.04.029.
- Ilme, T. A., & Moller, J. (2015). “He who can, he who cannot, teaches?” Stereotype threat and preservice teachers. *Journal of Educational Psychology*, 107, 300–308. doi:10.1037/a0037373.
- Inzlicht, M., & Ben-Zeev, T. (2000). A threatening intellectual environment: why females are susceptible to experiencing problem-solving deficits in the presence of males. *Psychological Science*, 11, 365–371. doi:10.1111/1467-9280.00272.
- Kanter, R. M. (1977). Some effects of proportions in group life: skewed sex ratios and responses to token women. *American Journal of Sociology*, 82, 965–990. doi:10.1086/226425.
- Kiefer, A. K., & Sekaquaptewa, D. (2007). Implicit stereotypes and women’s math performance: how implicit gender-math stereotypes influence women’s susceptibility to stereotype threat. *Journal of Experimental Social Psychology*, 43, 825–832. doi:10.1016/j.jesp.2006.08.004.
- Kuhn, M. H., & McPartland, T. S. (1954). An empirical investigation of self-attitude. *American Sociological Review*, 19, 68–75. doi:10.1086/226425.
- Lamont, R. A., Swift, H. J., & Abrams, D. (2015). A review and meta-analysis of age-based stereotype threat: negative stereotypes, not facts, do the damage. *Psychology and Aging*, 30, 180–193. doi:10.1037/a0038586.
- Lee, J.-E. R., & Nass, C. (2012). Distinctiveness-based stereotype threat and the moderating role of coercion contexts. *Journal of Experimental Social Psychology*, 48, 192–199. doi:10.1016/j.jesp.2011.06.018.
- Leonardelli, G. J., Pickett, C. L., & Brewer, M. B. (2010). Optimal distinctiveness theory: a framework for social identity, social cognition and intergroup relations. In M. Zanna & J. Olson (Eds.), *Advances in experimental social psychology* (Vol. 43, pp. 65–115). New York: Elsevier.
- Leyens, J.-P., Paladino, M. P., Rodriguez, R. T., Vaes, J., Demoulin, S., Rodriguez, A. P., & Gaunt, R. (2000). The emotional side of prejudice: the attribution of secondary emotions to ingroups and outgroups. *Personality and Social Psychology Review*, 4, 186–197. doi:10.1207/S15327957PSPR0402_06.
- Logel, C., Walton, G. M., Spencer, S. J., Iserman, E. C., von Hippel, W., & Bell, A. E. (2009). Interacting with sexist men triggers social identity threat among female engineers. *Journal of Personality and Social Psychology*, 96, 1089–1103. doi:10.1037/a0015703.
- Lord, C. G., & Saenz, D. S. (1985). Memory deficits and memory surfeits: differential cognitive consequences of tokenism for tokens and observers. *Journal of Personality and Social Psychology*, 49, 918–926. doi:10.1037/0022-3514.49.4.918.
- Louvet, E., & Rohmer, O. (2010). Les travailleurs handicapés sont-ils perçus comme des travailleurs compétents ? [Are workers with disability perceived as competent?]. *Psychologie du Travail et des Organisations*, 16, 47–62. doi:10.1016/S1420-2530(16)30160-1.
- Louvet, E., Rohmer, O., & Dubois, N. (2009). Social judgment of people with a disability in the workplace. *How to make a good impression on employers*. *Swiss Journal of Psychology*, 68, 153–159. doi:10.1024/1421-0185.68.3.153.
- Markova, M., Pit-Ten Cate, I., Krolak-Schwerdt, S., & Glock, S. (2016). Preservice teachers’ attitudes toward inclusion and toward students with special educational needs from different ethnic backgrounds. *The Journal of Experimental Education*, 84, 554–578. doi:10.1080/00220973.2015.1055317.

- Nguyen, H.-H. D., & Ryan, A. M. (2008). Does stereotype threat affect test performance of minorities and women? A meta-analysis of experimental evidence. *Journal of Applied Psychology, 93*, 1314–1334. doi:10.1037/a0012702.
- Osborne, J. (2001). Promoting argument in the science classroom: a rhetorical perspective. *Canadian Journal of Science, Mathematics and Technology Education, 1*, 271–290. doi:10.1080/14926150109556470.
- Pennington, C. R., Heim, D., Levy, A. R., & Larkin, D. T. (2016). Twenty years of stereotype threat research: a review of psychological mediators. *PLoS One, 11*, e0146487. doi:10.1371/journal.pone.0146487.
- Picho, K., Rodriguez, A., & Finnie, L. (2013). Exploring the moderating role of context on the mathematics performance of females under stereotype threat: a meta-analysis. *Journal of Social Psychology, 153*, 299–333. doi:10.1080/00224545.2012.737380.
- Ponticelli, J. E., & Russ-Eft, D. (2009). Community college students with disabilities and transfer to a four-year college. *Exceptionality: A Special Education Journal, 17*, 164–176. doi:10.1080/09362830903028473.
- Popovich, P. M., Scherbaum, C. A., Scherbaum, K. L., & Polinko, N. (2003). The assessment of attitudes toward individuals with disabilities in the workplace. *Journal of Psychology, 137*, 163–177. doi:10.1080/00223980309600606.
- Psaltis, C. (2012). Social representations of gender in peer interaction and cognitive development. *Social and Personality Psychology Compass, 6*, 840–851. doi:10.1111/j.1751-9004.2012.00466.x.
- Psaltis, C., & Duveen, G. (2006). Social relations and cognitive development: the influence of conversation type and representations of gender. *European Journal of Social Psychology, 36*, 407–430. doi:10.1002/ejsp.308.
- Quick, D., Lehmann, J., & Deniston, T. (2003). Opening doors for students with disabilities on community college campuses: what have we learned? What do we still need to know? *Community College Journal of Research and Practice, 27*, 815–827. doi:10.1080/713838274.
- Raven, J., Raven, J. C., & Court, J. H. (1998/2003). *Manual for Raven's progressive matrices and vocabulary scales*. San Antonio, TX: Harcourt Assessment.
- Régner, I., Steele, J. R., Ambady, N., Thinus-Blanc, C., & Huguet, P. (2015). Our future scientists: a review of stereotype threat in girls from early elementary school to middle school. *Revue Internationale de Psychologie Sociale/International Review of Social Psychology, 27*, 13–51. RIPS_3-4_2014.indd 13.
- Rohmer, O., & Louvet, E. (2006). Etre handicapé : quel impact sur l'évaluation de candidats à l'embauche ? [Disability: repercussions on the recruitment process?]. *Le Travail Humain, 69*, 49–65. doi:10.3917/th.691.0049.
- Rohmer, O., & Louvet, E. (2009). Describing persons with disability: salience of disability, gender, and ethnicity. *Rehabilitation Psychology, 54*, 76–82. doi:10.1037/a0014445.
- Rohmer, O., & Louvet, E. (2011). Le stéréotype des personnes handicapées en fonction de la nature de la déficience. Une application des modèles de la bi-dimensionnalité du jugement social [Stereotype content of disability subgroups—testing predictions of the fundamental dimensions of social judgment]. *L'Année Psychologique, 111*, 69–86. doi:10.4074/S0003503311001035.
- Rohmer, O., & Louvet, E. (2013). Utilité sociale et réussite universitaire d'étudiants avec et sans handicap : rôles respectifs de la compétence et de l'effort [Social utility and academic success of students with or without disability: the impact of competence and effort]. *Développement Humain, Handicap et Changement Social, 21*, 65–76. <http://www.ripph.qc.ca/revue/journal-20-03-2012-05>.
- Schmader, T., & Johns, M. (2003). Converging evidence that stereotype threat reduces working memory capacity. *Journal of Personality and Social Psychology, 85*, 440–452. doi:10.1037/0022-3514.85.3.440.
- Schmader, T., Johns, M., & Barquissau, M. (2004). The costs of accepting gender differences: the role of stereotype endorsement in women's experience in the math domain. *Sex Roles, 50*, 835–850. doi:10.1023/B:SERS.0000029101.74557.a0.
- Schmader, T., Johns, M., & Forbes, C. (2008). An integrated process model of stereotype threat effects on performance. *Psychological Review, 115*, 336–356. doi:10.1037/0033-295X.115.2.336.
- Sekaquaptewa, D., & Thompson, M. (2002). The differential effects of solo status on members of high and low status groups. *Personality and Social Psychology Bulletin, 18*, 694–707. doi:10.1177/0146167202288013.
- Sekaquaptewa, D., & Thompson, M. (2003). Solo status, stereotypes threat, and performance expectancies: their effects on women's performance. *Journal of Experimental Social Psychology, 39*, 68–74. doi:10.1016/S0022-1031(02)00508-5.
- Shapiro, J. R., & Neuberg, S. L. (2007). From stereotype threat to stereotype threats: implications of a multi-threat framework for causes, moderators, mediators, consequences, and interventions. *Personality and Social Psychology Review, 11*, 107–130. doi:10.1177/1088868306294790.
- Shapiro, J. R., & Williams, A. M. (2012). The role of stereotype threats in undermining girls' and women's performance and interest in STEM fields. *Sex Roles, 66*, 175–183. doi:10.1007/s11199-011-0051-0.
- Shih, M., Pitinski, T. L., & Ambady, N. (1999). Shifts in women's quantitative performance in response to implicit sociocultural identification. *Psychological Science, 10*, 80–90. doi:10.1111/1467-9280.00111.
- Spencer, S. J., Steele, C., & Quinn, D. (1999). Stereotype threat and women's math performance. *Journal of Experimental Social Psychology, 35*, 4–28. doi:10.1006/jesp.1998.1373.

- Steele, C. M. (1997). A threat in the air: how stereotypes shape intellectual identity and performance. *American Psychologist*, *52*, 613–629. doi:10.1037/0003-066X.52.6.613.
- Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African-Americans. *Journal of Personality and Social Psychology*, *69*, 797–811. 0022-3514/95/\$3.00.
- Stoet, G., & Geary, D. C. (2012). Can stereotype threat explain the gender gap in mathematics performance and achievement? *Review of General Psychology*, *16*, 93–102. doi:10.1037/a0026617.
- Thaver, T., & Lim, L. (2014). Attitudes of pre-service mainstream teachers in Singapore towards people with disabilities and inclusive education. *International Journal of Inclusive Education*, *18*, 1038–1052. doi:10.1080/13603116.2012.693399.
- Thomas, A. K., & Dubois, S. J. (2011). Reducing the burden of stereotype threat eliminates age differences in memory distortion. *Psychological Science*, *22*, 1515–1517. doi:10.1177/0956797611425932.
- Weinberg, N. (1976). Social stereotyping of the physically handicapped. *Rehabilitation Psychology*, *23*, 115–124. doi:10.1037/h0090911.
- Wout, D., Danso, H., Jackson, J., & Spencer, S. (2008). The many faces of stereotype threat: group- and self-threat. *Journal of Experimental Social Psychology*, *44*, 792–799. doi:10.1016/j.jesp.2007.07.005.
- Zhang, S., Schmader, T., & Hall, W. M. (2013). L'éggo my ego: reducing the gender gap in math by unlinking the self from performance. *Self and Identity*, *12*(4), 400–412. doi:10.1080/15298868.2012.687012.

Caroline Desombre. Assistant Professor, ESPE Lille Nord de France and Univ. Lille, EA 4072 - PSITEC - Psychologie : Interactions, Temps, Émotions, Cognition. E-mail: caroline.desombre@espe-lnf.fr

Current themes of research:

Stereotype. Education. Disability. Stereotype threat.

Most relevant publications in the field of Psychology of Education:

- Anegmar, S., Desombre, C., Delelis, G., Durand-Delvigne, A. (2015). Stéréotypes de l'étudiant en situation de handicap physique. Regards des étudiants valides sur deux situations de handicap: le handicap moteur et la surdité. *L'orientation scolaire et professionnelle*, (44/1).
- Delelis, G., Desombre, C., Anegmar, S. (2013). Approches environnementale et médicale du handicap : le cas des étudiants français. *Revue Québécoise de Psychologie*, *34*, 155–168.
- Desombre, C. (2011). Analyse psycho-sociale de l'intégration des élèves en situation de handicap. *Pratiques psychologiques*, *17*, 391–403.
- Durand-Delvigne, A., Desombre, C., Deboscher, S., Poissonnier, K. (2011). Comment favoriser l'orientation des filles vers les métiers de l'ingénieur? Evaluation d'un dispositif. *Psychologie du Travail et des Organisations*, *17*, 115–128.

Souad Anegmar. Ph.D., Univ. Lille, EA 4072 - PSITEC - Psychologie : Interactions, Temps, Émotions, Cognition. E-mail: souad.anegmar@univ-lille3.fr

Current themes of research:

Stereotype threat. Disability.

Most relevant publications in the field of Psychology of Education:

- Anegmar, S., Desombre, C., Delelis, G., Durand-Delvigne, A. (2015). Stéréotypes de l'étudiant en situation de handicap physique. Regards des étudiants valides sur deux situations de handicap: le handicap moteur et la surdité. *L'orientation scolaire et professionnelle*, (44/1).
- Delelis, G., Desombre, C., Anegmar, S. (2013). Approches environnementale et médicale du handicap : le cas des étudiants français. *Revue Québécoise de Psychologie*, *34*, 155–168.

Gérald Delelis. Assistant Professor, Univ. Lille, SCALAB, UMR 9193 (CNRS, Univ Lille). E-mail: gerald.delelis@univ-lille3.fr

Current themes of research:

Emotions. Emotional regulation.

Most relevant publications in the field of Psychology of Education:

Cartierre, N., Demerval, R., Delelis, G., Coulon, N., Nandrino, J.-L. (2011). Bio-ecological approach applied to adolescents' health: girls and boys in situations of contextual disconnection. In D. Chadee and A. Kosti (Eds.), *Social psychological dynamics* (pp. 195–210). Mona: The University of West India Press.

Cartierre, N., Demerval, R., Delelis, G., Nandrino, J.-L. (2008). Externalized disorders among girls and boys with cumulative contextual disconnection. *Psychology & Health*, 23 (1), 78.

Desombre, C., Delelis, G., Anegmar, S., Hanafi, M., Christophe, V., Antoine, P. (2011). Emotional regulation in students with or without disability. *Psychology & Health*, 26 (suppl. 2), 100.