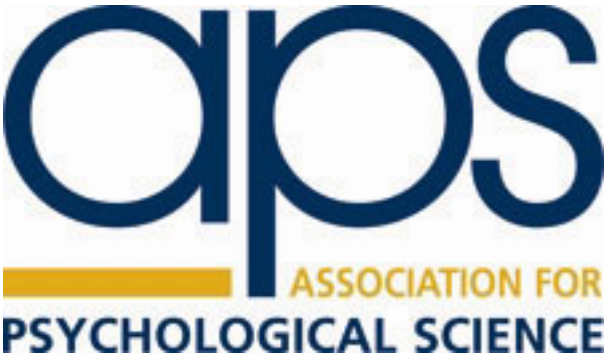

Research Report

ON THE ROLE OF FAMILIARITY WITH UNITS OF MEASUREMENT IN CATEGORICAL ACCENTUATION: Tajfel and Wilkes (1963) Revisited and Replicated

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Abstract—*The present article provides evidence for the role of participants' familiarity with units of measurement in categorical accentuation with unidimensional physical estimates. Belgian and American participants estimated the lengths of lines varying in length. Depending on the condition, the lines were or were not systematically associated with categorical labels, and the estimates were made either in inches or in centimeters. Consistent with our predictions, (a) categorical accentuation was higher when the lines were systematically categorized than when they were not, and (b) this effect was stronger when participants reported their estimates in an unfamiliar measurement unit (i.e., Belgian participants using inches, and American participants using centimeters). These findings support the view that people's reliance on categorical information is more likely to emerge given uncertain contexts of judgment. Additionally, they may help explain why researchers have had difficulties replicating the categorical accentuation effect in the past.*

Almost 40 years ago, Tajfel and Wilkes (1963) reported their now-classic experiment in which they asked participants to estimate category exemplars (i.e., lines) that varied continuously along a physical dimension (i.e., length). Participants provided their estimates in one of three conditions: Longer lines were systematically given a different label from shorter lines, each line was randomly given one of the two labels, or no labels were presented. Tajfel and Wilkes sought to demonstrate the cognitive-perceptual origin of stereotypes, that is, the exaggeration of perceived differences (resemblances) between members of different (the same) social groups. Specifically, the authors predicted that the systematic association of categorical labels with exemplars that varied along a physical continuum would (a) increase the perceived differences between exemplars from different categories and (b) decrease the perceived differences among exemplars of the same category. The results were consistent with the first prediction: Participants perceived a greater difference between the shortest of the long lines and the longest of the short lines in the systematic-categorization condition than in the other two conditions. Thus, participants' estimates of the exemplars that straddled the category boundaries were more differentiated in that condition than in the others.

Despite its apparent simplicity, this study played a key role both in the study of the cognitive processes involved in stereotyping and in the elaboration of social identity theory (see, e.g., Hogg & Abrams, 1988; Tajfel, 1969, 1978). This categorical accentuation effect, somewhat akin to the categorical perception effect evidenced in a more recent literature (e.g., Harnad, 1987), gave rise to an abundant body of research in cognitive social psychology. Similar effects were observed in the context of estimates about attitude statements (Eiser, 1971; Eiser & Stroebe, 1972; Eiser & Van der Pligt, 1984; McGarty & Penny, 1988), trait valences (Krueger & Rothbart, 1990), daily temperatures (Krueger & Clement, 1994), body weights (Krueger, Rothbart, & Sriram, 1989), and colors (Goldstone, 1995). They were also shown to emerge in judgments of category exemplars that varied along multiple dimensions (Corneille & Judd, 1999; Ford & Stangor, 1992; Goldstone, 1994, 1996; Livingston, Andrews, & Harnad, 1998).

Curiously, however, researchers had a hard time reproducing the classic effect when using the original paradigm, which, as discussed, involved estimates of line lengths (see, e.g., Andrews & Livingston, 2000; Lambert, 1999; McGarty, 1999). In his recent book on categorization in social psychology, McGarty (1999) noted that he had "lost count of the number of researchers who have told [him] that they attempted without success to replicate Tajfel and Wilkes' results using the original labeled line-judgment paradigm or minor variations on it" (McGarty, 1999, p. 73). Even more recently, Andrews and Livingston (2000) repeatedly failed to replicate the original effect and suggested that Tajfel and Wilkes's findings were probably due to demand characteristics of the task situation. These authors also noted that the effect could be obtained, but "only with *multidimensional* stimuli and only when the categories require *learning* (as opposed to the simple attachment of labels to known categories, as in Tajfel and Wilkes)" (Andrews & Livingston, 2000, p. 1015).

In agreement with Andrews and Livingston (2000), we believe that multidimensionality and learning are likely to enhance categorical accentuation. The issue, however, is whether these conditions are necessary for the effect to emerge, or, alternatively, if categorical accentuation can be obtained in conditions more akin to Tajfel and Wilkes's original paradigm. We hypothesized that categorical accentuation has the potential to emerge in unidimensional physical estimates (and given the simple pairing of categorical labels to stimuli), but that it will more likely do so given relatively high levels of uncertainty in the judgment task. In making this prediction, we relied on Tajfel and Wilkes's theoretical framework, in which the authors noted that "the class identification of a stimulus provides a supplementary source of information about the relationship of its magnitude with the magnitude of other stimuli" (Tajfel & Wilkes, 1963, p. 103). We assumed that participants would be more likely to rely on such a secondary source of information when experiencing uncertainty in the judgment task. Indeed, categorical labels may help them overcome their uncertainty regarding estimates. This argument is compatible with several studies showing that in conditions of subjective uncertainty, people preferably use categorical information to define themselves and others

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(see Castano, in press; Grieve & Hogg, 1999; Hogg, 2001; Hogg & Grieve, 1999; Mullin & Hogg, 1999; Yzerbyt, Castano, Leyens, & Palladino, 2000).

In the research we report here, we tested this line of reasoning by having participants estimate the lengths of eight lines that, depending on the condition, were or were not systematically associated with one of two categorical labels ("a" for the shortest ones and "b" for the longest ones). Crossed with that manipulation were participants' nationality (Belgian or American) and the measurement unit (inches or centimeters) in which they were asked to provide their estimates. Needless to say, we assumed that American participants would feel more uncertain about providing their estimates in centimeters than in inches, and that Belgian participants would feel more uncertain about providing their estimates in inches than in centimeters. We predicted (a) that the presence of a label would increase categorical accentuation, and (b) that this effect would be more pronounced when participants used unfamiliar, rather than familiar, measurement units. In other words, we predicted a triple Label × Nationality × Measurement Unit interaction, with accentuation due to the systematic categorization of the exemplars being more prevalent with unfamiliar estimates (Belgian participants judging in inches and American participants judging in centimeters) than with familiar estimates (Belgian participants judging in centimeters and American participants judging in inches).

Interestingly, this reasoning, if correct, may help explain why scholars in the field have had such a hard time (re)producing the original effect. As reported in their method section, Tajfel and Wilkes (1963) asked British participants to provide length estimates in centimeters (instead of inches). The use of an unfamiliar measurement unit may have increased participants' uncertainty regarding the estimates, resulting in a greater reliance on categorical information. We suspect that most subsequent replication attempts, contrary to Tajfel and Wilkes's original study, may have matched participants with their familiar measurement units. This use of familiar units may have decreased the potential for accentuation.

Because Tajfel and Wilkes (1963) obtained evidence for categorical accentuation only at the category boundaries, we focused on a single accentuation score, which corresponded to the difference between estimates of the shortest of the four long lines and the longest of the four short lines. The higher this index, the more participants accentuated the between-category differences at the category boundaries. We do not report measures of intracategorical variability (e.g., mean difference between estimates of the smallest and the longest lines within each category), which (a) are structurally dependent on the between-category difference score and (b) have never been shown to be sensitive to labeling effects in the context of unidimensional physical estimates.

Finally, we made two slight modifications of Tajfel and Wilkes's (1963) original paradigm. First, in conditions in which the labels were provided, participants were explicitly told that the lines were labeled. This modification was introduced to guarantee the success of our labeling manipulation (i.e., to make sure that participants would pay attention to the presence of categorical labels). Second, the whole procedure was standardized across the different estimates, participants, and experimental sessions by requiring that all estimates be generated within a fixed time window. Because our primary goal was to test for the possible emergence of categorical accentuation in unidimensional physical estimates, we did not deem these modifications critical.

METHOD

Participants and Design

Participants were 105 undergraduate students at the Free University of Brussels, Brussels, Belgium (n = 57), and the University of Colorado at Boulder (n = 48) who took part in the study on a voluntary basis or in return for course credits. They were randomly assigned to a 2 (label vs. no label) × 2 (inches vs. centimeters) between-subjects design. Crossed with these manipulations was participants' nationality (American or Belgian).

Procedure

Upon their arrival at the laboratory, participants received a folder containing instructions and the experimental materials. They were told that they would be presented with a series of straight lines whose lengths they would have to estimate (in either centimeters or inches) as precisely as possible just by looking at them (participants were asked not to use objects or body parts such as fingers or hands when making the estimates). Participants first received a sheet of paper with 10 lines, each associated with an objective length indication (in either centimeters or inches). Participants studied this sheet for 30 s so they would be reminded of, or familiarized with, the measurement unit they were to use (of course, none of these lines was used in the estimation task). Then, prior to the judgment task, participants were presented twice with the full series of lines that they would have to estimate. These lines were drawn diagonally on the center of a 21- × 29.5-cm sheet of paper. The lengths of the lines used in the task decreased linearly from the longest line (L8 = 11.4 cm) to the shortest line (L1 = 7.4 cm). As in Tajfel and Wilkes's (1963) study, the following orders were used for these initial presentations: L5-L6-L7-L8-L1-L2-L3-L4, then L4-L3-L2-L1-L8-L7-L6-L5.

Participants then started the judgment task, in which they estimated the length of each of the eight lines six times. Each of these 48 trials was timed by auditory signals. Upon the first signal, participants had to turn a page in the folder and proceed to examine a new line. After 8 s, a second signal invited participants to report their length estimate on a separate sheet of paper. After 5 s, a new signal invited participants to turn the page and proceed to a new line examination. After completing the 48 estimates, participants were thanked, debriefed, and dismissed. In the *label* condition, each of the shortest lines was systematically associated with the label "a" and each of the longest lines was systematically associated with the label "b" during both the two initial presentations and the judgment task. In the *no-label* condition, none of the lines was ever associated with a categorical label.

RESULTS AND DISCUSSION

We first transformed all participants' estimates into centimeters. Then, we computed for each participant his or her mean accentuation score. Remember that this score corresponds to the mean difference between estimates of L5 (the shortest of the long lines) and estimates of L4 (the longest of the short lines). These scores were then submitted to a 2 (Belgian vs. American) × 2 (centimeters vs. inches) × 2 (label vs. no label) analysis of variance.

Three effects turned out to be significant (see Table 1). First, the effect of labeling condition was consistent with the results of the original study by Tajfel and Wilkes (1963): Participants' differentiation at

Table 1. *Mean accentuation scores as a function of nationality, labeling condition, and measurement unit used*

	Belgian participants				American participants			
	No label		Label		No label		Label	
Measurement unit	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Centimeters	0.94	0.63	1.13	0.98	1.30	0.91	2.29	1.17
Inches	0.58	0.67	1.52	1.32	1.85	0.88	2.07	0.81

Note. All scores are reported in centimeters.

the category boundaries was higher in the label ($M = 1.72$) than in the no-label ($M = 1.31$) condition, $F(1, 104) = 10.17$, $p = .02$. Second, accentuation was more pronounced among American ($M = 1.87$) than among Belgian ($M = 1.04$) participants, $F(1, 104) = 20.12$, $p = .001$. The latter effect was unexpected. It may mean either that our American population was relatively more prone to categorical accentuation or that accentuation is enhanced given smaller unfamiliar measurement units. Finally, and more important, we obtained the predicted triple interaction, which revealed that accentuation due to categorical labeling was stronger when participants reported their estimates in an unfamiliar measurement unit (i.e., inches instead of centimeters for Belgian participants, and centimeters instead of inches for American participants), $F(1, 104) = 4.24$, $p = .042$.

We also tested our prediction that within each national group, a first-order interaction between label and measurement unit would emerge in addition to a main effect of label. In contrast tests, we used the weights -2, -2, 1, 3 and -2, -2, 3, 1, for the Belgian and the American participants, respectively, for the no-label/centimeters, no-label/inches, label/centimeters, and label/inches conditions. As expected, the first contrast (and only this one) was significant for Belgian participants, $F(1, 56) = 6.30$, $p < .02$, and the second contrast (and only this one) was significant for American participants, $F(1, 47) = 5.18$, $p < .03$.

These findings confirm that categorical accentuation due to the systematic categorization of stimuli can be obtained with unidimensional physical estimates (and in conditions in which categorical labels are simply attached to stimuli). Additionally, they confirm that categorical accentuation is more likely to emerge when unfamiliar measurement units are used than when familiar units are used—that is, under conditions of higher uncertainty of the judgment task. The present study thus represents a successful replication of the accentuation effect reported by Tajfel and Wilkes (1963) almost 40 years ago, and supports the view that reliance on categorical information likely increases under conditions of higher uncertainty (see, e.g., Hogg, 2001).

As we mentioned in the introduction, we suspect that most unsuccessful attempts at replicating Tajfel and Wilkes's (1963) findings matched participants with their familiar measurement units. Admittedly, however, this point is speculative given that these failures of replication have generally not been reported (see McGarty, 1999). We should also note that Andrews and Livingston (2000) failed to reproduce the effect in conditions using unfamiliar units. One major discrepancy between their paradigm and ours, however, is that participants' estimates were speeded in the present study. It is possible, then, that the relative time pressure introduced in our study enhanced the difficulty (uncertainty) of the task, thereby increasing the potential for accentuation.

Finally, an issue that deserves to be examined in future research relates to whether categorical accentuation operates at the perceptual level (as participants "see" the lines) or as participants convert their impressions into metric judgments. Because accentuation studies conducted in cognitive social psychology generally involve very explicit estimates of category exemplars, one should refrain from drawing any firm conclusion regarding whether categorization potentially distorts participants' perception in such settings (see also Corneille & Sinaceur, 2001). The impact of categorization may very well be an impact on the ways in which perception is mapped onto a given response language, with categorization playing a larger role when the response language is an unfamiliar, rather than a familiar, one. This, however, does not necessarily mean that experimental demand effects are operating. One possibility, already noted by Tajfel and Wilkes (1963), is that participants dealing with uncertain estimates seek out all available information in order to increase confidence in their judgments. The fact that, in the present study, accentuation effects were enhanced when there was a mismatch between participants' nationality and the measurement unit appears consistent with this interpretation.

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