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Journal of Experimental Social Psychology 40 (2004) 659–665
Journal of Experimental Social Psychology
www.elsevier.com/locate/jesp

Coaction and upward social comparison reduce the illusory conjunction effect: Support for distraction–conflict theory☆

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Received 11 February 2003; revised 25 November 2003
Available online 3 February 2004

Abstract

This article proposes an integration of Festinger's (1954) social comparison theory and Baron's (1986) distraction–conflict theory of the social facilitation–inhibition effect, which successfully predicts attentional focusing in coaction when social comparison represents a distraction. Two experiments confronted participants with the illusory conjunction task (Treisman, 1998), where illusions occur because of the lack of attentional processing of central cues. If coaction, like upward comparison, is distracting and thereby enhances the attention allocated to central cues (here the target's features) at the expense of peripheral cues (here distractors), then a reduction should be found in the illusions. Experiment 1 indeed showed a lower rate of conjunctive errors under upward comparison than under downward comparison. Experiment 2 specified that this effect was due to downward comparison effectively reducing distraction, with upward comparison only maintaining it, as compared to mere coaction.

Keywords: Social facilitation and inhibition; Coaction; Social comparison; Distraction–conflict theory; Illusory conjunction; Attentional focusing; Perception

The social facilitation–inhibition effect refers to the fact that the presence of an audience or of coactors (i.e., persons working independently on the same task) sometimes facilitates, and sometimes inhibits performance (Bond & Titus, 1983). This apparent paradox has been resolved by Zajonc (1965), who proposed that the presence of others increases the tendency to display dominant responses (i.e., those that are first in the behavioral repertory), which in turn facilitates or inhibits performance, depending on the appropriateness of these dominant responses. Although this "drive theory" is still pre-eminent in the field (Guerin, 1993), there is still disagreement about the mechanisms involved in the explanation of social facilitation–inhibition.

Among the theories of social facilitation–inhibition, some rely upon attentional processes (e.g., Baron, 1986; Manstead & Semin, 1980) rather than dominant response as the basis for an explanation of this effect. Baron's (1986) distraction–conflict theory postulates that, in situations of attentional conflict between the task and some distractors, for instance the presence of a coactor, conflict leads to a cognitive overload that produces attentional focusing. Attentional focusing is defined as a narrowing of attention: More attention is allocated to central cues while peripheral cues are neglected (Cohen, 1978; Geen, 1976). Hence, performance is enhanced if the task only requires central cues, but impaired if peripheral cues are necessary to perform

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0022-1031/$ - see front matter
doi:10.1016/j.jesp.2003.12.003

adequately. In this view, attentional focusing is the main mediator of the social facilitation–inhibition effect.

One task that has been extensively used to study attention is the Stroop task (MacLeod, 1991). In the classical version (Stroop, 1935), participants have to name the color of patches (control items) or that of color-incompatible words (e.g., the word "red" written in green). The Stroop interference describes the fact that response time is slowed down by color-incompatible words. This interference is said to be due to the relative automaticity of word reading (Kahneman & Chajczyk, 1983; MacLeod, 1991). This task was used by Huguet, Galvaing, Monteil, and Dumas (1999) to test an attentional explanation of social facilitation–inhibition: If the presence of others leads to attentional focusing (Baron, 1986), then attention to colors (here, central cues) should be enhanced and lowered for word meaning (peripheral cues), thereby reducing Stroop interference. Indeed, they found that the mere presence of others, as well as upward social comparison (the other person is superior to the self) during coaction, led to a decrease in Stroop interference, contrary to drive theory, which would have predicted an increase in interference, due to the use of the dominant response (reading). However, Huguet et al. (1999) explained these results in terms of a strategic (conscious) inhibition of word reading, which is not necessary to an attentional explanation. The Stroop literature allows such an interpretation in terms of strategic inhibition: Some authors have demonstrated that using strategies can lower Stroop interference (e.g., Logan, Zbrodoff, & Williamson, 1984). It is also worth noting that such strategies can be systematic: Participants can inhibit the same tendency, i.e., reading, on all items.

The aim of the present contribution is to provide more definitive support for the attentional hypothesis of distraction–conflict theory, showing that the positive impact of mere coaction, as well as of upward social comparison, can be found *even* when the task does not rely upon a learned process (as in the Stroop task, cf. MacLeod, 1991) and, most importantly, *even* when a systematic strategy cannot improve performance.

Accordingly, the present contribution used a task designed to demonstrate a perceptual effect of attentional allocation, namely the illusory conjunction effect (Treisman, 1988). According to Treisman (1988), in the first stage of visual perception, the perceptual system extracts—automatically (without any attention required), and simultaneously (every characteristic is processed at the same time)—the visual primitives, i.e., the simplest perceptual features of the object. The second stage—in which attentional processing is needed—is the association phase: Visual primitives are bound if they are parts of the same object. Interestingly, Treisman (1998, p. 1305) specified that "binding failures (...) occur with high load displays when several objects must be processed under time pressure." For example, a leaning "$" target presented among distractors (e.g., vertical and horizontal bars) will be considered as present when in fact only its visual primitives—i.e., the leaning "S" and the leaning bar—have been presented (very briefly), but have been combined in an illusory manner (Treisman & Paterson, 1984). Here, the leaning bar and the leaning S are the central cues for determining the target's presence, while the distractors are peripheral cues. Thus, if coaction induces a higher attentional focusing through distraction (Baron, 1986), only central cues—and not peripheral—should receive attention, making illusory conjunction less likely to occur.

This task appears to be highly relevant to an unambiguous test of the attentional hypothesis of distraction–conflict theory, since the illusory conjunction effect is due to a lack of attentional processing of central cues (i.e., the visual primitives of the target). Moreover, contrary to the Stroop task, which is based on a learned skill (i.e., reading, cf. MacLeod, 1991), this task is a more purely perceptual one, given that illusory conjunctions are found with many different stimulus features, even when there is no reference to letters (e.g., Prinzmetal, 1981). Finally, what makes the illusory conjunction paradigm that we used highly diagnostic for our concern is that the use of a strategic and systematic inhibition of a certain type of response, e.g., always saying that the target is present, could be detected. Hence, if—contrary to our predictions—participants use this kind of strategy in coaction and/or in upward social comparison, their error rate should be lower (compared to the alone condition) when the target is actually present (what we called here "conjunctive items") *but* should be higher when the target is actually present (here the "non-conjunctive items").

One may ask why coactors should be sources of distraction. Sanders, Baron, and Moore (1978) contend that coactors are sources of social comparison information. It has indeed been demonstrated that coaction affects performance only when the coactor is a relevant target of comparison: Sanders et al. (1978) found that when the coactor performed another task, no facilitation was observed. Moreover, as stated by Wills (1986, p. 283): "Comparison process is strengthened when people face a potentially unfavourable comparison (i.e., upward social comparison)." The corollary is that comparison is less relevant when the individual is superior to the coactor, i.e., under downward social comparison. Indeed, Seta (1982) showed that no facilitation effects were observed in downward social comparison. As noted by Seta himself, in social comparison there exists a drive upward (Festinger, 1954) which typically leads individuals to be more interested, in laboratory as in natural settings, in upward social comparison (e.g., Nosanchuk & Erickson, 1985; Wheeler & Miyake, 1992; see Wood, 1989, for a review), and to be satisfied with their performance only when they are superior to the target of comparison (Festinger, 1954; Rijsman, 1974; Seta, 1982). When uncertainty about abilities is low and self-evaluation is satisfactory—i.e., under downward social comparison, when one's own performance is better than that of the coactor—comparison is not problematic and therefore not distracting. Thus, in downward social comparison no attentional conflict between the task and social comparison information should be expected. In this case, in the terms of distraction–conflict theory, the performance should be the same as when the individual is alone (Seta, 1982).

To sum up, the above articulation between distraction–conflict and social comparison theories leads to the prediction that coaction will produce attentional conflict (and thereby favor attentional focusing) as long as comparison is problematic. The rate of conjunctive errors should therefore be lowered in: (1) mere coaction, because there is potential for an unfavourable comparison; and (2) upward social comparison, because of explicitly unfavourable comparison; but not in (3) downward social comparison, since the drive upward is satisfied. It is also worth noting that, if it is true that only attentional processes are at work (and not a systematic strategic inhibition), no differences should be found in the rate of non-conjunctive errors (claiming that the target is not present when in fact it is), since for these items errors are not due to a lack of attentional processing (Treisman & Paterson, 1984).

Experiment 1

Method

Sample

Sixty-nine students were randomly distributed across the three conditions (alone, upward social comparison, and downward social comparison). As a manipulation check, participants were asked whether the experimenter told them that they made more or fewer errors than the coactor. Three participants were dropped because they could not report this information, and six because of their suspiciousness about the experiment.

Materials and procedure

Eighty conjunctive and 80 non-conjunctive items were created, similar to those used by Treisman and Paterson (1984). Conjunctive items consisted of pictures with five leaning bars and "S"s and five horizontal, and vertical bars forming straight angles. Non-conjunctive items were the same, but a "$" was substituted for an "S" (see Fig. 1). The order of presentation was randomised.

For each item, participants were asked to indicate if the symbol "$" was present (by pressing the "P" key) or absent ("A" key). As depicted in Fig. 1, items were displayed after a fixation point. Seventy milliseconds were chosen for item-durations in order to favour illusory conjunctions. Indeed, this duration is too short to allow attentional processing of the entire pattern of elements (cf. Treisman & Paterson, 1984). After each item, participants were required to give their answers during the mask. They were also requested to make as few errors as possible.

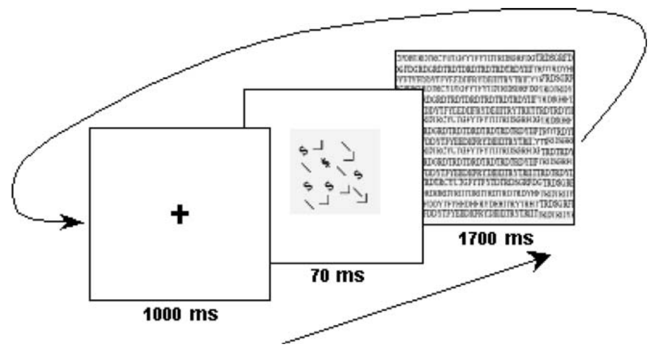

Fig. 1. Items presentation schema.

The experiment took place in an experimental cubicle with two computers, one across from the other. The experimenter explained that, for time reasons, he would run two participants at the same time (one was a confederate). In the alone condition, participants were alone in the cubicle during all experimental phases. The experimenter remained outside the cubicle during all experimental phases.

In the first experimental phase (preceded by a practice phase), 32 items (16 conjunctive and 16 non-conjunctive items) were presented. As depicted in Fig. 2, for this phase, there were only two conditions: Alone and mere coaction. Afterwards, during the manipulation phase, social comparison was introduced for coaction participants by providing bogus feedback: "You have made more errors/fewer errors than your colleague" respectively for upward social comparison, and downward social comparison conditions. Nothing was said in the alone condition. Then participants proceeded to the second experimental phase (80 conjunctive and 80 non-conjunctive items). Finally, participants were debriefed and thanked.

Results and discussion

Control of the paradigm

First of all, it was important to demonstrate that the present materials and procedure deal with the illusory conjunction effect. If it is the case, the illusion should appear when both perceptual features of the target are present but the target is actually absent. Thus, this illusion should lead to a higher error rate when the target is absent (but not its features) than when the target is present. The presence of the illusory conjunction effect

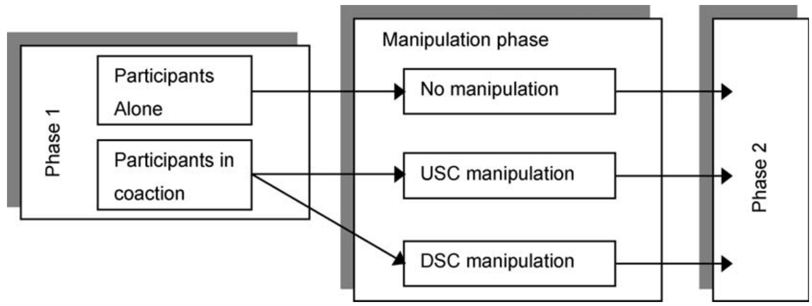

Fig. 2. Summary of experiment 1 procedure (USC, Upward Social Comparison; DSC, Downward Social Comparison).

would then be indicated by a higher error rate for conjunctive items than for non-conjunctive items.[1] An analysis of variance (ANOVA) performed on the type of items in the control group (i.e., the alone condition) showed that this was the case in the first phase (M_{cj} = 61.50%, SD_{cj} = 23.79%; $M_{n\text{-}cj}$ = 14.10%, $SD_{n\text{-}cj}$ = 6.07%), $F(1,19) = 34.85$, $p < .001$, $\eta^2 = .64$, as well as in the second phase (M_{cj} = 42.49%, SD_{cj} = 21.14%; $M_{n\text{-}cj}$ = 7.7%, $SD_{n\text{-}cj}$ = 7.12%), $F(1,19) = 43.57$, $p < .001$, $\eta^2 = .69$.

Error rate

Our first prediction led us to expect a lower rate of conjunctive errors in the coaction conditions compared to the alone condition. Hence, in phase 1, participants in the coaction condition (that will become upward social comparison and downward social comparison conditions in phase 2, see Fig. 2) should obtain a lower conjunctive error rate than the participants in the alone condition. Moreover, the second and third predictions led us to expect that only the upward social comparison condition should have a lower error rate than the alone condition, as downward social comparison should lead to lose the effect of coaction on attentional focusing. Thus, in phase 2, the rate of conjunctive errors in the downward social comparison condition should be higher than that in the upward social comparison condition and at the same level as the alone condition. In order to test these two models, one for each phase, we conducted a one-way ANOVA with two orthogonal contrasts for each phase: one planned comparison testing the model and one contrast testing the remaining variance (i.e., the only orthogonal contrast, which should not be significant if the model fits the data).

The planned comparison for phase 1 then opposed the alone condition to the two coaction conditions. This test was significant, $F(1, 57) = 4.02$, $p < .05$, $\eta^2 = .066$. Importantly, the orthogonal contrast showed no difference between the two coaction conditions, $F(1, 57) < 1$. As shown in Table 1, it is indeed the case that both coaction conditions led to a lower conjunctive error rate than in the alone condition.

The planned comparison for phase 2 then opposed the upward social comparison condition to both downward social comparison and alone conditions. This test was also significant, $F(1, 57) = 6.78$, $p < .012$, $\eta^2 = .10$. Moreover, the orthogonal contrast showed no difference between the downward social comparison, and alone conditions $F(1, 57) < 1$. As shown in Table 1, it is the case that a lower conjunctive error rate was found only in the upward social comparison condition.

It is worth noting that the same analyses have been conducted on the rate of non-conjunctive errors. However, these analyses did not reveal any significant effects.

It was hypothesized that if coaction does indeed lead to enhanced attentional focusing, then fewer conjunctive errors should occur, even when systematic response

Table 1
Experiment 1: Mean rate of conjunctive errors

Phase	Condition		
	USC ($n = 20$)	DSC ($n = 20$)	Alone ($n = 20$)
Phase 1	$50.70\%_a$ (12.79)	$50.01\%_a$ (22.50)	$61.50\%_b$ (23.79)
Phase 2	$27.85\%_a$ (13.07)	$41.33\%_b$ (23.38)	$42.49\%_b$ (21.14)

Means sharing the same subscript within the same line do not differ significantly at the .05 level (one tailed), standard deviations in parenthesis (USC, Upward Social Comparison; DSC, Downward Social Comparison).

[1] One could argue that the higher error rate for items where the target is not present (conjunctive items) when compared to items where the target is present (non-conjunctive items) does not demonstrate binding errors, because it may also reflect a positivity bias, i.e., preference for a positive response. Thus, it could be argued that participants made more errors on conjunctive items only because the correct answer was negative (the target is not present), but they preferred to respond positively (the target is present). To rule out this explanation it would be necessary to demonstrate that the error rate with our conjunctive items (the target is absent but both its features—the bar and the S—are present) is higher than the rate of errors on additional control items (those used in Treisman & Paterson, 1984), in which the correct response is also negative (the target is actually absent) but in which only one feature is present (i.e., either the bar or the S). Two ad hoc studies ($N = 11$ in both) allowed us to demonstrate and to replicate that the error rate was higher for our conjunctive items than for these additional control items, $t(10) = 5.57$, $p < .001$, $t(10) = 7.02$, $p < .001$, respectively, for Study 1 and 2.

strategies are not possible. The results from phase 1 gave full support to this attentional view of coaction effects, since mere coaction led to fewer conjunctive errors than the alone condition. Moreover, mere coaction did not affect the non-conjunctive error rate, which should have been the case if a systematic strategy was used (i.e., systematically responding less often with a judgment of "present").

Phase 2 confirmed that, when explicit comparison was induced, the positive impact of coaction on conjunctive errors was found only when participants were told they were inferior to the target (see also Seta, 1982). Conversely, when participants were told they were superior, they performed as in the alone condition.

These results are interpreted here as a removal of the positive impact of coaction in downward social comparison, due to a decrease in attentional focusing. However, a plausible alternative interpretation could be that the lower conjunctive error rate in the upward social comparison condition is not due to attentional focusing, but rather to participants "trying harder," supplying more effort, following a possible representation of the upward social comparison manipulation in terms of a negative performance feedback. The disconfirmation of this alternative interpretation would then require a direct comparison of mere coaction, upward social comparison, and downward social comparison, which was absent in Experiment 1. Indeed, if this alternative interpretation was accurate, one would expect the upward social comparison participants to display a lower conjunctive error rate than participants in the mere coaction condition, given that in mere coaction there would be no negative feedback. Conversely, if—as we contend—downward social comparison plays a central role by reducing distraction and if upward social comparison only maintains it (compared to mere coaction), the former condition should be the only one with a higher conjunctive error rate. In order to distinguish more clearly between these two alternative interpretations, a second experiment was conducted in which mere coaction, upward social comparison, and downward social comparison could be directly compared in phase 2.

Experiment 2

Method

Sample

Thirty-five students were randomly distributed over the three conditions (mere coaction, upward social comparison, and downward social comparison). One participant was dropped for not reporting the correct feedback score, and two others because of their suspiciousness about the experiment.

Materials and procedure

Materials and procedure were the same as in Experiment 1, with two exceptions. First, all participants performed under coaction conditions. Second, the social comparison feedback was more precise. Thus, in both upward social comparison and downward social comparison conditions, bogus scores appeared directly on their computer screens. Participants were attributed 65% of correct responses, while the coactor's score was presented as 80% under upward social comparison, and 50% under downward social comparison.

Results and discussion

Error rate

Since all participants were in coaction, both upward social comparison and mere coaction conditions should elicit a lower conjunctive error rate than downward social comparison. As in Experiment 1, we tested our prediction with two orthogonal contrasts, one planned comparison testing the model, and one contrast testing the remaining variance.[2]

The planned comparison then opposed the downward social comparison condition to the upward social comparison and mere coaction conditions. This test was significant, $F(1,29) = 5.89$, $p = .022$, $\eta^2 = .17$. Moreover, the orthogonal contrast showed no difference between the upward social comparison and mere coaction conditions $F(1,29) < 1$. As can be seen in Table 2, a higher conjunctive error rate was found only in the downward social comparison condition.

It is worth noting that the same analyses have been conducted on the rate of non-conjunctive errors. However, these analyses did not reveal any significant effects.

In sum, when all participants were in coaction, only the downward social comparison condition induced a higher conjunctive error rate. It therefore seems reasonable to conclude that the results in Experiment 1 were due to a lowered performance in downward social comparison rather than to a positive impact of upward social comparison. It is now easier to assert that in Experiment 1 downward social comparison played the key role, and more difficult to suppose that the results were due to participants trying harder after receiving negative performance feedback (i.e., a perspective which would give the central role to upward social comparison). These results thus provide support for distraction–conflict theory: When the drive upward is satisfied (Festinger, 1954), as in downward social comparison,

[2] In this experiment the only purpose of the first phase was to reproduce the same experimental setting as in Experiment 1, and to create an excuse to provide the social comparison feedback; no manipulation was introduced at this point, and therefore no analysis will be presented for phase 1. However, we did run a one-way ANOVA that showed no biased random assignment to conditions.

Table 2
Experiment 2: Mean rate of conjunctive errors

Condition		
USC ($n = 11$)	DSC ($n = 10$)	Mere coaction ($n = 11$)
21.94 $\%_a$ (16.68)	37.76 $\%_b$ (22.63)	19.66 $\%_a$ (15.30)

Means sharing the same subscript do not differ significantly at the .05 level (one tailed), standard deviations in parenthesis (USC, Upward Social Comparison; DSC, Downward Social Comparison).

comparison is less problematic and less distracting (Sanders et al., 1978), which explains the increased rate of conjunctive errors.

General discussion

Both studies supported an attentional view of social facilitation–inhibition. Indeed, it was shown that mere coaction can enhance attentional focusing and thereby reduce illusory conjunctions. It is worth noting that reporting a significant social facilitation of performance accuracy is far from trivial in the social facilitation–inhibition literature (cf. Bond & Titus, 1983). Bond and Titus' (1983) meta-analysis indeed revealed that social facilitation of accuracy is far more difficult to find than social impairment (of both speed and accuracy), and social facilitation of speed of response. It then seems that an attentional approach may highlight conditions under which coaction can improve speed performance (i.e., when peripheral cues slow down response time, as in the Stroop task; Huguet et al., 1999) as well as accuracy (i.e., when attentional focusing on central cues can reduce errors, as in the present task). The next step in demonstrating the relevance of this attentional approach will be to show that coaction can both reduce accuracy and increase speed of response when there is a wide array of relevant cues. Future research will inspect this hypothesis.

Moreover, Experiment 1 suggested, and Experiment 2 confirmed, that the positive impact of mere coaction could be removed by reassuring respondents as to the favorability of the comparison, as when respondents think that they are superior to the coactor. These results argue for the relevance of integrating distraction–conflict (Baron, 1986), and social comparison (Festinger, 1954) theories. Indeed, it appeared that when the drive upward is satisfied (Festinger, 1954), as in downward social comparison, comparison is less problematic and less distracting (Sanders et al., 1978), leading to the loss of the positive impact of coaction. This integration opens new avenues for the study of moderating and mediating role of social comparison in coaction. Such an approach might also have practical implications, for instance in education. This approach could suggest that at school a coactor, even if nothing is specified regarding his or her competence, can be represented as a possible target of upward comparison, and therefore be distracting.

In addition to providing evidence for an attentional view of social facilitation–inhibition, these results, like those reported by Huguet et al. (1999), question Zajonc's (1965, 1980) explanation of coaction effects. In this task, the dominant response was to see the target as present (participants saw the target when it was present, but also when it was not). Thus, Zajonc's theory would predict an enhancement of this tendency in coaction, resulting in more conjunctive errors. The results showed the opposite effect.

Concerning the task we used, some authors, such as Donk (1999), have questioned whether illusory conjunctions are really perceptual illusions, and proposed that they could be due to a guessing bias: People would not *see* the target present (when it is not), but they would just try to guess what they did not have the time to actually see. However, there are at least two reasons to be only mildly concerned by this controversy. The first one is that scholars working on illusory conjunctions have repeatedly shown that this effect cannot be due to guessing (e.g., Craver-Lemley, Arterberry, & Reeves, 1999; Prinzmetal, Ivry, Beck, & Shimizu, 2002). The second reason is that a perceptual account of illusory conjunctions allowed a straightforward formulation of our predictions. Conversely, even if it was possible to find an alternative explanation of the present results in terms of social impact on guessing, this explanation would be fairly complicated and would run against the mainstream of research on illusory conjunctions.

Overall, these studies confirm the value of the cross-fertilisation between cognitive and social psychology. First, the use of a task that relies only upon attentional mechanisms allowed a clear and unambiguous test of an attentional interpretation of social facilitation–inhibition effects, ruling out non-attentional explanations such as strategic inhibition. Second, the above results show that social context can strongly modulate visual processes, even with respect to an effect recognized to be extremely robust (Prinzmetal, 1995; Prinzmetal, Henderson, & Ivry, 1995).

References

Baron, R. S. (1986). Distraction–conflict theory: Progress and problems. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (19, pp. 1–40). New York: Academic Press.

Bond, C. F., & Titus, L. J. (1983). Social facilitation: A meta-analysis of 241 studies. *Psychological Bulletin, 94*, 265–292.

Cohen, S. (1978). Environmental load and the allocation of attention. In A. Baum, J. E. Singer, S. Valins (Eds.), *Advances in environmental* *psychology* (Vol. 1, the Urban Environment, pp. 1–29). Hillsdale, NJ: Lawrence Erlbaum.

Craver-Lemley, C., Arterberry, M. E., & Reeves, A. (1999). "Illusory" illusory conjunctions: The conjoining of features of visual and imagined stimuli. *Journal of Experimental Psychology: Human Perception and Performance, 25*, 1036–1049.

Donk, M. (1999). Illusory conjunctions are an illusion: The effects of target-nontarget similarity on conjunction and feature errors. *Journal of Experimental Psychology: Human Perception and Performance, 25*, 1207–1233.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*, 117–140.

Geen, R. G. (1976). Test anxiety, observation, and range of cue utilization. *British Journal of Social and Clinical Psychology, 15*, 253–259.

Guerin, B. (1993). *Social facilitation*. Paris: Cambridge University Press, Editions de la maison des sciences de l'homme.

Huguet, P., Galvaing, M. P., Monteil, J. M., & Dumas, F. (1999). Social presence effects in the Stroop task: Further evidence for an attentional view of social facilitation. *Journal of Personality and Social Psychology, 77*, 1011–1025.

Kahneman, D., & Chajczyk, D. (1983). Tests of the automaticity of reading: Dilution of Stroop effects by color-irrelevant stimuli. *Journal of Experimental Psychology: Human Perception and Performance, 9*, 497–509.

Logan, G. D., Zbrodoff, N. J., & Williamson, J. (1984). Strategies in the color-word Stroop task. *Bulletin of the Psychonomic Society, 22*, 135–138.

MacLeod, C. M. (1991). Half a century of research on the Stroop effect: An integrative review. *Psychological Bulletin, 109*, 163–203.

Manstead, A. S., & Semin, G. R. (1980). Social facilitation effects: Mere enhancement of dominant responses? *British Journal of Social and Clinical Psychology, 19*, 119–136.

Nosanchuk, T. A., & Erickson, B. H. (1985). How high is up? Calibrating social comparison in the real world. *Journal of Personality and Social Psychology, 48*, 623–624.

Prinzmetal, W. (1981). Principles of feature integration in visual perception. *Perception & Psychophysics, 30*, 330–340.

Prinzmetal, W. (1995). Visual feature integration in a world of objects. *Current Directions in Psychological Science, 4*, 90–94.

Prinzmetal, W., Henderson, D., & Ivry, R. (1995). Loosening the constraints on illusory conjunctions: Assessing the roles of exposure duration and attention. *Journal of Experimental Psychology: Human Perception and Performance, 21*, 1362–1375.

Prinzmetal, W., Ivry, R. B., Beck, D., & Shimizu, N. (2002). A measurement theory of illusory conjunctions. *Journal of Experimental Psychology: Human Perception and Performance, 28*, 251–269.

Rijsman, J. B. (1974). Factors in social comparison of performance influencing actual performance. *European Journal of Social Psychology, 4*, 279–311.

Sanders, G. S., Baron, R. S., & Moore, D. L. (1978). Distraction and social comparison as mediators of social facilitation effects. *Journal of Experimental Social Psychology, 14*, 291–303.

Seta, J. J. (1982). The impact of comparison processes on coactors' task performance. *Journal of Personality and Social Psychology, 42*, 281–291.

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology, 18*, 643–662.

Treisman, A. (1988). Features and objects: The fourteenth Bartlett memorial lecture. *Quarterly Journal of Experimental Psychology, 40A*, 201–237.

Treisman, A. (1998). Feature binding, attention, and object perception. *Philosophical Transactions Royal Society London B, 353*, 1295–1306.

Treisman, A., & Paterson, R. (1984). Emergent features, attention, and object perception. *Journal of Experimental Psychology: Human Perception and Performance, 10*, 12–31.

Wheeler, L., & Miyake, K. (1992). Social comparison in everyday life. *Journal of Personality and Social Psychology, 62*, 760–773.

Wills, T. A. (1986). Discussion remarks on social comparison theory. *Personality and Social Psychology Bulletin, 12*, 282–288.

Wood, J. V. (1989). Theory and research concerning social comparisons of personal attributes. *Psychological Bulletin, 106*, 231–248.

Zajonc, R. B. (1965). Social facilitation. *Science, 149*, 269–274.

Zajonc, R. B. (1980). Compresence. In P. B. Paulus (Ed.), *Psychology of group influence* (pp. 35–60). Hillsdale, NJ: Lawrence Erlbaum.