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Social contagion of time perception☆

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Abstract

To test the hypothesis that the perception of time's passage converges towards consensus in interactive groups, 38 participants completed a "word puzzles" task in groups of four to six. Four groups performed the task interactively (Interactive Condition) and four groups performed it without interacting (Control Condition). Both intraclass correlations and within-group variance measures revealed, as predicted, that more within-group consensus emerged in the Interactive Condition (versus the Control Condition) for measures of perceived time speed and mood. Alternatives to an explanation based on the dynamics of interaction are discussed, and the results are placed in the larger scope of recent theory and research on socially shared cognition.

Keywords: Consensus; Contagion; Time perception; Mood

People influence each other, and that influence often leads to the emergence of consensus (Crandall, 1988; Hardin & Higgins, 1996; Latane, 1996; Schaller & Conway, 2001). This simple fact can have consequences for virtually every aspect of human existence. One of those aspects is both central and universal to the human experience—the passage of time.

The importance of shared perceptions of time

Time perception plays an important (if understudied) psychological role in many aspects of human life. For example, evidence suggests that perceptions of how quickly time passes are related to such psychological disorders as depression (Mezey & Cohen, 1961; Prabhu, Agrawal, & Teja, 1969). Additionally, Carstensen and her colleagues (Carstensen & Fredrickson, 1998; Carstensen & Turk-Charles, 1994; Fredrickson & Carstensen, 1990) have shown that perceptions of the amount of *future* time available may have an impact on the goals that people pursue in their lives. Indeed, time perception may have important implications for many areas of psychology, including social, personality, developmental, cultural, and cognitive psychology (see Carstensen, Isaacowitz, & Charles, 1999; McGrath & Kelly, 1986). Thus, to the degree that time perception is influenced by other people, understanding the nature of that influence may provide important clues about many kinds of psychological experiences.

At a more sociological level, whole cultures are defined in part by their shared perceptions of time. It can thus be difficult to adapt to a new culture's different (often *implicitly* different) sense of time, or "pace of life" (Levine, 1997). Thus, understanding how people influence each other to build shared perceptions of time might enable us to gain insight into how cultural beliefs about time emerge.

Where do shared perceptions of time come from?

If shared beliefs involving time perception exist, then where do they come from? One alternative is that they emerge from shared environments. For example, the "pace of life" within cultures is positively related to both industrialization and individualism (Conway, Ryder, Tweed, & Sokol, 2001; Levine, 1997). These findings are

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purely correlational in nature, so no firm causal conclusions can be drawn, but they are at least consistent with the idea that different environmental and psychological climates are conducive to distinct paces of life (Conway et al., 2001).

But shared perceptions of time could also emerge through direct communication between persons, without any shared environmental input. Although shared environmental inputs and interpersonal communication processes can and almost certainly do co-occur (and thus do not offer competing theories), evidence *does* suggest that when conformity pressures are operating, perceptions of time *can* become shared through communication. In research mirroring Sherif's famous "autokinetic effect" studies, for example, Montgomery and Enzie (1971) asked people to estimate short (15–75 s) time intervals in groups. These groups either gave their answers out loud (thus allowing for conformity pressures), or wrote their answers down silently. There was greater consensus in time perception in groups where conformity pressures could have operated (Montgomery & Enzie, 1971; for related evidence, see Tasaki, Kano, & Yoshitake, 1988).

In research of this sort, participants are both working on a time perception task and are made aware of the time perceptions of others. Although some of our experience is like this (we do, after all, discuss our shared impressions of time's passage—"wow, that talk dragged on forever!"), surely much of it is not. During most of our time with other people, we are not actively pursuing a shared impression of time's passage. So, does time perception consensus emerge even when people are working on a task that does not require them to focus on the passage of time?

Conceptual framework

The basic hypothesis of this paper is that people who interact with each other will experience the passage of time more similarly than people who do not interact with each other. This hypothesis is built on the simple assumption that when changes occur (either explicitly or implicitly) in the psychological factors that affect the time perceptions of group members, then changes can occur in the group's experience of time. Whenever people interact, psychological factors relevant to time perception will thus tend to synchronize, due to mutual influence or mutual experience, and so people will experience the passage of time similarly.

What factors influence time perception?

Many psychological factors may influence the perceived passage of time. For example, some research suggests that humans use heuristic cues—such as the number of distinct tasks performed during a time interval—to make judgments about their own experience of time (see e.g., Arlin, 1989; Block & Reed, 1978; Flaherty, 1991; Perdi & Hesketh, 1993). Another important factor is mood (or affect). There is considerable evidence suggesting that mood influences the perception of time. Specifically, happy people report that time passes more quickly than depressed people (Baum, Boxley, & Sokolowski, 1984; Hawkins, French, Crawford, & Enzle, 1998; Hoffer & Osmond, 1962; Mezey & Cohen, 1961; Prabhu et al., 1969). Although the relationship between mood and time perception is more consistent when time measurements are subjective (e.g., "how quickly did the time seem to pass?"), rather than objective (e.g., "how much objective time do you think passed?"; see Hawkins et al., 1998), there *is* evidence that the maxim "time flies when you're having fun" is correct.

The present hypothesis

My hypothesis embodies the following causal chain: (1) interaction leads to the formation of consensus about mood; (2) mood has an impact on time perception; and so (3) mood consensus leads to consensus in time perception.

As noted earlier, there is evidence for the second step in this causal chain. Research provides even clearer support for the first step: mood *does* converge when people interact (see Friedman & Riggio, 1981; George, 1990; Hatfield, Cacioppo, & Rapson, 1994; Hsee, Hatfield, & Chemtob, 1992; Totterdell, 2000; Totterdell, Kellett, Teuchmann, & Briner, 1998; see also George & Brief, 1992). For example, George (1990) demonstrated that many sales teams develop a distinct "affective tone." Similarly, Totterdell and his colleagues (Totterdell, 2000; Totterdell et al., 1998) have found convergence of mood among people in nursing teams, accounting teams, and professional cricket teams. Across a number of laboratory and naturalistic contexts, researchers have found that the members of an interacting group will tend to form a kind of mood consensus (see Kelly & Barsade, 2001, for a review).

Overview of the experiment

In the following experiment, some people were instructed to do a "word puzzles" task while interacting in groups (Interactive Condition). Other people did the same task without interacting, but also in groups (Control Condition). The task was unexpectedly interrupted after awhile, and then measures of time perception (including both an "objective" time estimate and a measure of the "subjective" speed of time's passage) and mood were completed. There were three basic predictions: (1) participants in the Interactive Condition should demonstrate more within-group consensus in time perception than participants in the Control Condition; (2) participants in the Interactive Condition should demonstrate more within-group consensus in mood than participants in the Control Condition; and (3) the effect of the interaction manipulation on time perception consensus should be mediated by the participants' mood consensus.

Method

Participants

Thirty-eight undergraduate students (15 female, 14 male, and nine unreported) at the University of Montana participated for research credit. Participants signed up to participate in a "Word Puzzles" study session. Each session contained only one group. Groups were comprised of four to six members (the average group size was 4.75). Groups were randomly assigned to one of the two experimental conditions. Four groups participated in each condition. Participant gender (and the gender composition of groups) were included as variables in all key analyses, but yielded no effects, so they will not be discussed further.

Procedures

Initial instructions to all participants. Upon arriving, participants were instructed to remove their watches (if they had them) and to put them in their pockets. This was described as "just a precaution to help eliminate potential distractions." All participants were also told that they would have 1 hour and thirty minutes to complete as many word puzzles as possible. The word puzzles had supposedly been rated for difficulty, with more difficult puzzles earning more "points" for participants (actually, no points were awarded to participants). Participants were also told that they would not know the difficulty of the puzzles while they were working on them. The issue of difficulty was raised only to ensure that participants did not just "skip" word puzzles that they could not immediately answer.

Interactive Condition. After hearing about the scoring system, groups in the Interactive Condition were told that:

1. People in each group would take turns writing a word puzzle on the chalkboard, but everyone would work each puzzle out together.
2. Once the group had agreed on a solution, the current "puzzle writer" would write that solution down. Only then could the group proceed to the next puzzle.
3. Only the person at the board was allowed to write things down.
4. Groups could not ask the experimenter any questions once the word puzzles began.

To ensure at least a moderate level of interaction among the members of their groups, participants in the Interactive Condition were encouraged to speak with one another about their ideas for solving the word puzzles.

Although the experimenter was present during all sessions, no formal measurements of group discussions or activities were made.

Control Condition. After hearing about the scoring system, groups in the Control Condition were given instructions similar to those just described. As in the Interactive Condition, these groups were told that they must come up with a solution before moving on to another problem, and they could not ask the experimenter any questions once the word puzzles began.

Unlike the Interactive Condition, group members in the Control Condition were given separate answer sheets and told to work on the word puzzles in silence. Control Condition participants were also told not to write anything down on those sheets other than the puzzle solutions, with the following exception. Recall that Interactive Condition participants wrote down a copy of the puzzle on the chalkboard, and that each person did this approximately every sixth puzzle. In order to mimic this potential heuristic cue relevant to time perception (see e.g., Block & Reed, 1978), Control Condition participants were told to draw, for every sixth word puzzle, an additional copy of that puzzle on their sheet. The primary purpose of the instructions to both conditions was to ensure that (other than the interactive component) all aspects of the word puzzle task were as close as possible in both the Interactive and Control Conditions.

The completion of the word puzzles. After hearing the "rules," all participants were given the following example of the kind of word puzzles that they would be solving:

I need help
  here.

Such word puzzles are typically solved by examining the spatial relationships among the words. Participants were told that the answer to the example was "I need help over here" because "I need help" is located *over* "here." After explaining the example, the experimenter instructed participants to begin solving the actual word puzzles.

Participants in both the Interactive and Control Conditions worked on the same word puzzles in the same order. Without drawing attention to his actions, the experimenter (quietly) started a timer that beeped loudly exactly 37 minutes after participants began their work. Once this "beeping" occurred, the experimenter interrupted the session and administered the dependent measures.

Dependent measures

Time estimates. The experimenter quickly circulated the first questionnaire, which contained just two items. The first item (time estimate) was of primary interest here: "How many minutes do you think have passed

Table 1
Means for dependent variables by condition

Measure	Interactive Condition		Control Condition		*t*	*p*
	Mean	*SD*	Mean	*SD*		
Time estimate	39.4	13.3	33.1	10.0	1.68	.102
Time speed	7.7	0.9	6.7	2.3	1.76	.091
Mood	6.8	1.2	5.1	1.5	3.93	.000

Note. $n = 38$. All p values are liberal estimates because approximately half of the data points on which the tests are computed are interdependent.

since the exact point you began working on the word puzzles?"

Confidence in time estimate. A second, more exploratory, item concerned the confidence the participants had in their time estimate: "How confident are you that your time estimate in #1 above is within 5 minutes of being correct, where 1 = not at all confident and 9 = very confident?" This "confidence" measure is ancillary to the key hypotheses and will not be discussed further.

Mood. Immediately after the questionnaire, participants completed a mood measure comprised of eight items. The first five of these were Likert-style bipolar items similar to those used in previous research (e.g., Matthews, Jones, & Chamberlain, 1990; Totterdell & Briner, 1996; Totterdell, 2000). On these items, participants were instructed to "circle the number that best represents your current state (i.e., how you are feeling right now) on each of the following dimensions," on a scale ranging from 1 to 9. The anchors for these items were "sad/happy," "bored/excited," "irritable/pleasant," "sociable/unsociable," and "moody/stable." The sixth item was a free-response question asking participants to describe their current mood. This item was coded by the author (while blind to condition) on a 1–9 scale representing general mood positivity. A second rater (blind to each participant's condition and to the hypotheses underlying the experiment) also coded this item to check for reliability (Intraclass Correlation = .93, $p < .001$). Two additional items asked participants to rate (on 9-point scales) how much they enjoyed the experiment, and how good or bad the experiment made them feel.

The "sociable/unsociable" item was later dropped because the anchors were unintentionally reversed, which confused some participants. The remaining seven items (six 9-point ratings and one coded free-response question) were combined into a single composite representing the overall mood of participants (coefficient $\alpha = .94$). Scores on this composite measure could range from 1 to 9, with higher scores indicating that the participants were in a more positive mood.

Perceived time speed. To ascertain the subjective speed at which time passed for the participants, they were asked aloud: "How quickly do you think the time seemed to pass?" Possible responses were 1 = not at all quickly to 9 = very quickly. This measure was added after one group had already participated, so only 33 of the 38 participants (seven of the eight groups) completed this measure.

Results

Means and intercorrelations for the dependent variables are presented in Tables 1 and 2. Note that these are individual-level results, and thus have no direct bearing on the hypotheses. More direct tests of those hypotheses were performed and are reported below.

Did more within-group consensus emerge in the interactive condition?

To test my hypotheses that interaction among group members would lead to greater consensus on the time estimates, perceived time speeds, and moods of participants, two separate methods were employed.

Intraclass correlation coefficients. First, separate sets of intraclass correlation coefficients (ICCs) were computed for the Interactive and Control conditions. The formula for these ICCs was taken from Bartko (1976): (MSB-MSW)/MSB. To compute each ICC, a one-way ANOVA with group as the independent variable was performed. The resulting F value was used to calculate inferential statistics pertinent to whether each ICC differed from zero (see McGraw & Wong, 1996). To the degree that these ICCs are greater than zero, participants' scores were closer to those of their own group members than to those of other group members within their condition.

For the Interactive Condition groups, these analyses yielded positive ICCs on time estimates (ICC = .66, $p = .07$), perceived time speeds (ICC = .74, $p = .05$), and mood (ICC = .73, $p = .03$). All corresponding ICCs for the Control Condition groups were <0.

Table 2
Correlations among major dependent variables

	TE	TS	M
Time estimate (TE)	—	—	—
Time speed (TS)	.25	—	—
Mood (M)	.33	.35*	—

Note. $^{*}p < .05$; $n = 38$ for TE–M r; other n's = 33. All r's and p values are overly liberal estimates because approximately half of the data points on which the tests are computed are interdependent.

Within-group variance by condition. A more direct method of measuring consensus within a group is to calculate the within-group variance. Within-group variance is inversely related to consensus. Here, the variance was computed separately for each group, and these within-group variances were then submitted to inferential tests by condition, using the group as the level of analysis (Conway, 2000; Montgomery & Enzie, 1971; Sherif, 1936; see Conway & Schaller, 1998). For these computations, the population (not the sample) formula for computing variance was used (see Conway & Schaller, 1998).

Consistent with predictions, participants in the Interaction Condition had less average within-group variance (and thus greater consensus) for *perceived time speeds* ($t[5] = 3.77$, $p = .007$) and *moods* ($t[6] = 3.45$, $p = .007$, both tests one-tailed) than participants in the Control Condition. No effect was found for *time estimates* ($t[6] = -0.26$). Table 3 summarizes these analyses.

Mood as a mediator of the perceived time speed-interaction relationship

Was the emergence of greater consensus on *perceived time speed* among Interactive Condition versus Control Condition groups mediated by *mood* consensus as predicted? (No mediation analyses were attempted for time estimates because that measure showed no effect on the within-group variance scores). To test this hypothesis, correlations were computed at the group level of analysis between the interaction manipulation (dummy-coded as Control Condition = 0, Interaction Condition = 1), perceived time speed variance, and mood variance (within-group variance scores on mood). Mood variance was then partialled from the correlation between perceived time speed variance and the manipulation dummy variable. The correlation between the manipulation and perceived time speed variance dropped from .86 ($p = .007$) to .58 ($p = .11$, both tests one-tailed) after partialling out *mood* variance.

Although this suggests that mood accounts for a relatively small part of perceived time speed consensus, controlling for the group *mean* (i.e., each group's average score, as opposed to each group's variance) on mood completely wiped out the effect: The .86 correlation between the manipulation and perceived time speed variance dropped to −.08 after partialling out group means for mood.

Alternative explanations

In addition to mood, two other mediators for the perceived time speed effect were explored. These provide potentially non-interaction-based alternative explanations for the results.

Group mean differences on perceived time speed. There were mean differences by condition on perceived time speed, with Interactive Condition groups scoring higher (see Table 1). Thus, it is possible that the interaction manipulation caused a main effect on perceived time speed that led to the appearance of dynamically emerging consensus within groups (Conway, 2000).

To explore this alternative explanation, the correlation (at the group level of analysis) between the interaction manipulation and the amount of within-group variance on perceived time speed was computed. Then, this same correlation was computed while controlling for the mean score for each group on perceived time speed. The zero-order effect size on within-group variance for perceived time speed was $r = .86$ ($p = .007$). When group means on perceived time speed were taken into account, this effect remained strong at $r = .76$ ($p = .04$). Thus, the key effect for within-group variances was not simply an artifact of mean differences between conditions.

Number of word puzzles. Another issue involves the number of word puzzles completed by participants: Unlike Control Condition participants, all Interactive Condition participants were forced to complete the same number of puzzles. This factor, rather than group interaction, could have produced the observed consensus effects, because participants may have used the number of puzzles they completed as a cue for making judgments about time perception.

Analyses using the within-group variance of "puzzles completed" as a mediator are inappropriate in this case. All Interactive Condition groups had a variance of "0" on that variable, and all such groups were (via dummy-coding) assigned a score of "1" for the manipulation. Thus, any correlation involving both variance in the number of puzzles completed and the manipulation would be artifactually high (in this case, $r = -.92$). Controlling for puzzles completed within-group variance, while computing the key interaction-*perceived time speed* variance correlation, would almost certainly reduce the size of the correlation, simply as an artifact of

Table 3
Average within-group variance by condition

Measure	Condition		t	p (one-tailed)	Effect
	Interactive	Control			Size (r)
Time estimate	107.1	93.5	−0.26	n/a	.10
Time speed	0.4	4.6	3.77	.007	.86
Mood	0.7	2.0	3.45	.007	.82

Note. Higher variance equals lower consensus. For time estimate and mood, $n = 8$. For perceived time speed, $n = 7$.

the forced dependence between the puzzles completed variance and the manipulation.

The interaction manipulation also influenced the mean level of completed puzzles, with participants in Interactive Condition groups completing fewer word puzzles than those in Control Condition groups (two-tailed $p = .02$). Because this difference is not a statistical artifact, mediation analyses are appropriate. However, those analyses suggested that the mean level of puzzles completed did not account for my key finding—even when controlling for the group mean number of puzzles completed, the correlation between the interaction manipulation and the perceived time speed within-group variance was strong and significant (zero-order $r = .86$, $p = .007$; partial $r = .83$, $p = .02$).

Discussion

The results provided some support for the hypotheses that interaction within groups causes both time perception and mood to converge toward group consensus. Across two different methods for measuring consensus, group members who interacted with each other exhibited more within-group consensus for both perceived time speed and mood than did group members who did not interact. This suggests that individual experiences of time and of mood tend to become more like those of other group members in interactive contexts. Although the mood finding is not novel, this is the first evidence (to my knowledge) that group consensus on a time perception variable can emerge in contexts where participants are not directly engaging in a time perception task.

Why did different results emerge on the two time perception variables?

The findings suggest a more consistent pattern of results for the subjective passage of time than for more objective time estimates. Given that other research has also found different effects for these two different kinds of time perception (e.g., Hawkins et al., 1998), it is not entirely surprising that different patterns emerged for each variable here. But what might account for this discrepancy? Maybe the more dynamic processes that led to consensus in the Interactive Condition on perceived time speed did not operate for time estimates. This is plausible—more subjective factors, such as mood and perceived time speed, may be more susceptible to the subjective influence involved in interpersonal communication. However, given the fact that ICCs suggested there was *something* going on with the *time estimate* measure, it may be premature to dismiss more dynamic consensus-formation processes with respect to objective estimates of time's passage.

The impact of mood

One of my hypotheses was that consensus in moods among members of interactive groups would mediate their consensus about time perception. This mediation effect was not very impressive, however. The time perception consensus effect remained strong even when controlling for mood consensus. Support for Hypothesis 3 was thus weak.

However, controlling for the *mean* level of mood in a group eliminated the effect of the interaction manipulation on within-group time perception consensus. What does this mean? Previous research suggests that positive moods lead to greater group consensus in mood than do negative moods (Totterdell, 2000). This may be because positive moods are more contagious. There may also be something about positive (versus negative) moods that changes group dynamics, such that different types of subjective experiences are more likely to become shared. Thus, the consensus effect for perceived time speed may occur mostly in groups whose members are in a relatively happy mood.

Of course, this is only speculation. Indeed, it is worth noting that this explanation is not completely consistent with the results reported here. The tendency for positive moods to invoke consensus has only been observed in previous work when comparing different types of *interacting* groups. But here, the positivity in moods accounted for differences in consensus between interacting and *non-interacting* groups. Why exactly this occurred is harder to conceptualize. The mediation of time perception consensus effects by mean mood levels thus represents an interesting but puzzling phenomenon.

Strengths and limitations of the present study

Strengths. In this research, two very different ways of operationalizing consensus were used. The strengths of each method partially complement the weaknesses of the other. The first set of analyses, involving Intraclass Correlations, produced results that cannot be explained by unintended differences between the Interactive and Control conditions. Indeed, one could view the Interactive Condition as a small quasi-experiment within the experiment. Because the ICCs were computed within condition, the fact that the perceived time speed ICC was strongly positive in the Interactive Condition cannot be attributed to unintended individual-level effects of the manipulation itself.

However, the ICC's dependence on mean differences between groups left open the possibility that consensus was simply an artifact of simple mean differences among Interactive Condition groups. Comparing within-group variances between the Interactive and Control Condition groups allowed for more direct tests of mean differences. The consensus difference between the two conditions remained strong, even when controlling for the group mean differences between conditions in perceived time speed.

Thus, although both the ICCs and the cross-condition comparisons had their weaknesses as methods, using them together produced a story more compelling than using either one alone. Taken together, perhaps the best (and certainly the most parsimonious) explanation of my findings is that participants' perceptions of time became similar to perceptions of their fellow group members through interaction.

Limitations. Although suggestive and novel, this research has some limitations worth noting. First, it cannot clearly account for *why* the time perception consensus emerged. The one clear mediator of the time consensus effect (group mean level of mood) was conceptually difficult to unpackage. Further, there are aspects of the interaction manipulation that cannot be ruled out as alternative explanations of the effect, such as forced agreement on the number of word puzzles solved in the Interactive Condition. (Similarly, the experimenter was not blind to conditions, and so differential experimenter behavior cannot be ruled out as a factor). Because of these difficulties, it is possible that the effect is due to some individual-level effect of the interaction manipulation, rather than to the dynamic processes of group interaction. But, whatever the case may be, a *straightforward* individual-level effect of the interaction manipulation on group time perception means cannot account for the perceived time speed consensus, because controlling for the mean level of perceived time speed did not greatly reduce the effect. Some caution in interpreting the results is still warranted, however.

Another limitation is that no formal measurements were made of what Interactive Condition participants did and said as they solved the word puzzles. This makes it less certain that these participants did *not* talk about their perceptions of time. Two things should be noted about this limitation. First, to the best of my knowledge (and I was the only experimenter), time was not discussed by any of the participants in any session. Second, even if participants *did* discuss their perceptions of time to some small degree, the experiment provides a unique contribution to our understanding of time perception. It suggests, at the very least, that even when groups are not explicitly instructed to work on a time perception task, or to discuss their perceptions of time, a consensus about time can still form.

Concluding thoughts: socially shared cognition

A recent trend in social cognition theory and research has been to focus less on the thoughts of the single individual about others, and more on the ways in which cognitions are shared *across* individuals (see Hinsz, Tindale, & Vollrath, 1997; Larson & Christensen, 1993; Thompson & Fine, 1999). An example of the latter approach is work on transactive memory, which suggests people use other group members as memory resources, leading to a kind of collective memory (e.g., Moreland, 1999; Moreland, Argote, & Krishnan, 1996; Wegner, 1987). My research may also help us transcend the gap between individual and interpersonal processes. Although much previous work has addressed factors that influence time perception at the individual level, my work suggests that it may be fruitful to consider how people can share the experience of time as well.

References

Arlin, M. (1989). The effects of physical work, mental work, and quantity on children's time perception. *Perception and Psychophysics, 45*, 209–214.

Bartko, J. J. (1976). On various intraclass correlation coefficients. *Psychological Bulletin, 83*, 762–765.

Baum, S. K., Boxley, R. L., & Sokolowski, M. (1984). Time perception and psychological well-being in the elderly. *Psychiatric Quarterly, 56*, 54–61.

Block, R. A., & Reed, M. A. (1978). Remembered duration: Evidence for a contextual-change hypothesis. *Journal of Experimental Psychology: Human Learning and Memory, 4*, 656–665.

Carstensen, L. L., & Fredrickson, B. F. (1998). Socioemotional selectivity in healthy older people and younger people living with the human immunodeficiency virus: The centrality of emotion when the future is constrained. *Health Psychology, 17*, 1–10.

Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist, 54*, 165–181.

Carstensen, L. L., & Turk-Charles, S. (1994). The salience of emotion across the adult life course. *Psychology and Aging, 9*, 259–264.

Conway III, L. G. (2000, August). Interpreting measurements of consensus. In: R.L. Moreland (Chair), *Statistical issues in group research*. Symposium conducted at the 108th Annual Convention of the American Psychological Association, Washington, DC.

Conway III, L. G., Ryder, A. G., Tweed, R. G., & Sokol, B. W. (2001). Intra-national cultural variation: Exploring further implications of collectivism within the United States. *Journal of Cross-Cultural Psychology, 32*, 681–697.

Conway III, L. G., & Schaller, M. (1998). Methods for the measurement of consensual beliefs within groups. *Group Dynamics: Theory, Research, and Practice, 2*, 241–252.

Crandall, C. S. (1988). Social contagion of binge eating. *Journal of Personality and Social Psychology, 55*, 588–598.

Flaherty, M. G. (1991). The perception of time and situated engrossment. *Social Psychological Quarterly, 54*, 76–85.

Fredrickson, B. L., & Carstensen, L. L. (1990). Choosing social partners: How old age and anticipated endings make us more selective. *Psychology and Aging, 5*, 335–347.

Friedman, H. S., & Riggio, R. E. (1981). Effect of individual differences in nonverbal expressiveness on transmission of emotion. *Journal of Nonverbal Behavior, 6*, 96–104.

George, J. M. (1990). Personality, affect, and behavior in groups. *Journal of Applied Psychology, 75*, 107–116.

George, J. M., & Brief, A. P. (1992). Feeling good-doing good: A conceptual analysis of the mood at work-organizational spontaneity relationship. *Psychological Bulletin, 112*, 310–329.

Hardin, C., & Higgins, E. T. (1996). Shared reality: How social verification makes the subjective objective. In R. M. Sorrentino, & E. T. Higgins (Eds.), *Handbook of motivation and cognition, Foundations of social behavior* (Vol. 3, pp. 28–84). New York: Guilford.

Hatfield, E., Cacioppo, J. T., & Rapson, R. L. (1994). *Emotional contagion*. Cambridge, England: Cambridge University Press.

Hawkins, W. L., French, L. C., Crawford, B. D., & Enzle, M. E. (1998). Depressed affect and time perception. *Journal of Abnormal Psychology, 97*, 275–280.

Hinsz, V. B., Tindale, R. S., & Vollrath, D. A. (1997). The emerging conceptualization of groups as information processors. *Psychological Bulletin, 121*, 43–64.

Hoffer, A., & Osmond, H. (1962). The relationship between mood and time perception. *Psychiatric Quarterly Supplement, 36*, 87–92.

Hsee, C. K., Hatfield, E., & Chemtob, C. (1992). Assessments of the emotional states of others: Conscious judgments versus emotional contagion. *Journal of Social and Clinical Psychology, 11*, 119–128.

Kelly, J. R., & Barsade, S. G. (2001). Mood and emotions in small groups and work teams. *Organizational Behavior and Human Decision Processes, 86*, 99–130.

Larson, J. R., & Christensen, C. (1993). Groups as problem-solving units: Toward a new meaning of social cognition. *British Journal of Social Psychology, 32*, 5–30.

Latane, B. (1996). Dynamic social impact: The creation of culture by communication. *Journal of Communication, 46*(4), 13–25.

Levine, R. (1997). *The geography of time: The temporal misadventures of a social psychologist*. New York: Basic Books.

Matthews, G., Jones, D. M., & Chamberlain, A. G. (1990). Refining the measurement of mood: The UWIST Mood Adjective Checklist. *British Journal of Psychology, 81*, 17–42.

McGrath, J. E., & Kelly, J. R. (1986). *Time and human interaction: Toward a social psychology of time*. New York: Guilford Press.

McGraw, K. O., & Wong, S. P. (1996). Forming inferences about some intraclass correlations coefficients. *Psychological Methods, 1*, 30–46.

Mezey, A. G., & Cohen, S. I. (1961). The effect of depressive illness on time judgment and time experience. *Journal of Neurology, Neurosurgery, and Psychiatry, 24*, 269–270.

Montgomery, R. L., & Enzie, R. F. (1971). Social influence and the estimation of time. *Psychonomic Science, 22*, 77–78.

Moreland, R. L. (1999). Transactive memory: Helping workers learn who knows what. In J. Levine, L. Thompson, & D. Messick (Eds.), *Shared cognition in organizations: The management of knowledge* (pp. 3–31). Mahwah, NJ: Lawrence Erlbaum.

Moreland, R. L., Argote, L., & Krishnan, R. (1996). Socially shared cognition at work. In J. Nye, & A. M. Brower (Eds.), *What's social about social cognition?* (pp. 57–84). Thousand Oaks, CA: Sage.

Perdi, S., & Hesketh, B. (1993). Time perception: Effects of task speed and delay. *Perceptual and Motor Skills, 76*, 599–608.

Prabhu, G. G., Agrawal, A. K., & Teja, J. S. (1969). Effect of anxiety and depression on time estimation and judgment. *Indian Psychological Review, 6*, 16–21.

Schaller, M., & Conway III, L. G. (2001). From cognition to culture: The origins of stereotypes that really matter. In G. B. Moscowitz (Ed.), *Cognitive social psychology: The Princeton Symposium on the Legacy and Future of Social Cognition* (pp. 163–176). Mahwah, NJ: Erlbaum.

Sherif, M. (1936). *The psychology of social norms*. New York: Harper.

Tasaki, T., Kano, S., & Yoshitake, K. (1988). The experimental study of internal and external conformity on time perception. *European Journal of Social Psychology, 18*, 281–286.

Thompson, L., & Fine, G. A. (1999). Socially shared cognition, affect, and behavior: A review and integration. *Personality and Social Psychology Review, 3*, 278–302.

Totterdell, P. (2000). Catching moods and hitting runs: Mood linkage and subjective performance in professional sport teams. *Journal of Applied Psychology, 85*, 848–859.

Totterdell, P., & Briner, R. B. (1996). Fingerprinting time series: Dynamic patterns in self-report and performance measures uncovered by graphical non-linear method. *British Journal of Psychology, 87*, 43–60.

Totterdell, P., Kellett, S., Teuchmann, K., & Briner, R. B. (1998). Evidence of mood linkage in work groups. *Journal of Personality and Social Psychology, 74*, 1504–1515.

Wegner, D. M. (1987). Transactive memory: A contemporary analysis of the group mind. In B. Mullen, & G. R. Goethals (Eds.), *Theories of group behavior* (pp. 185–208). New York: Springer.