

Social reality makes the social mind

Self-fulfilling prophecy, stereotypes, bias, and accuracy

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This paper contests social psychology's emphasis on the biased, erroneous, and constructed nature of social cognition by: (1) showing how the extent of bias and error in classic research is overstated; (2) summarizing research regarding the accuracy of social beliefs; and (3) describing how social stereotypes sometimes improve person perception accuracy. A Goodness of Judgment Index is also presented to extract evidence regarding accuracy from research focusing on bias. We conclude that accuracy is necessary for understanding social cognition.

Keywords: stereotypes, self-fulfilling prophecies, bias, accuracy, social perception

How are social beliefs related to social reality? Are people's social beliefs typically uninformed by social reality? Do people routinely change their behavior to fit others' expectations? Or do social beliefs primarily result from, rather than cause, social reality? These are fundamental questions, and their answers respectively define humans as socially confounded, living in social worlds of their own (or others') invention, or as socially astute, negotiating the social world as it is.

This paper reviews evidence showing that the mind typically reflects rather than produces social reality. There are exceptions, and constructivist phenomena, such as self-fulfilling prophecy and expectancy-confirming bias, occur. But such phenomena are often small and fleeting, whereas accuracy and responsiveness to social reality tend to be substantial and enduring. The paper

is divided into three sections that demonstrate how social perception reflects more than it creates social reality: (1) a review of the expectancy-confirming bias and self-fulfilling prophecy research that reveals the limited power of these effects; (2) a review of research demonstrating accuracy in social perception; and (3) a reinterpretation emphasizing accuracy of research widely regarded as evidence of error and bias.

The limited power of expectancy-confirming biases

Expectancy-confirming biases occur when people's expectations cause them to perceive other people's behavior, accomplishments, or attributes in a manner that confirms these expectations.

This includes, but is not restricted to, stereotype-based expectations. For example, people evaluated a fourth grader's performance on a test more favorably when they believed she was from a middle class background than when they believed she was from a lower class background (Darley & Gross, 1983). Similarly, teachers sometimes more positively evaluate students for whom they have high (rather than low) expectations, even after controlling for actual performance (Jussim, 1989; Williams, 1976).

The power of expectancies to bias perception is one basis for the common social psychological emphasis on the power of beliefs to construct social reality. For example: "... people often see what they expect to see: they select evidence that confirms their stereotypes and ignore anomalies" (Jones, 1986, p. 42; for similar claims see, e.g., Fiske & Taylor, 1991; Jost & Kruglanski, 2002).

However, the accumulated evidence indicates that expectancies do not greatly bias social perception. Table 1 presents the results from meta-analyses of studies assessing expectancy-confirmation in many contexts. It shows that the effects of expectancies, averaged over hundreds of experiments, range only from 0 to .25.

The simple arithmetic mean of the effect sizes is .10, which is an overestimate, because the meta-analyses with more studies yielded systematically lower effect sizes ($r = -.43$ between effect size and number of studies). The few naturalistic studies of expectancy-confirming judgmental biases have yielded similarly small effects (e.g., Clarke & Campbell, 1955; Jussim, 1989; Williams, 1976). An overall effect of .10 means that expectancies substantially influence social perceptions about 5% of the time (as per Rosenthal's (1984) binomial effect size display). This means they *do not* influence perceptions 95% of the time.

Table 1. Meta-analyses of expectancy-confirmation studies

Meta-analysis	Topic/Research question	Number of studies	Average expectancy effect
Swim et al., 1989	Do sex stereotypes bias evaluations of work?	119	.04
Stangor & McMillan, 1992	Do expectations bias memory?	65	.03
Sweeney & Haney, 1992	Does race bias criminal sentencing?	19	.09
Mazella & Feingold, 1994	Are mock jurors' verdicts affected by defendant:		
	Attractiveness	25	.10
	Race	29	.01
	Social class	4	.08
	Sex	21	.04
Kunda & Thagard, 1996	Do stereotypes bias judgments of targets:		
	Without individuating information?	7	.25
	With individuating information?	40	.19

Effect sizes are correlations (r 's), between expectation and outcome. All meta-analyses focused on experimental research. Positive effects represent stronger expectancy-confirming biases and favoring the more privileged or high status groups (men, Whites, the rich, the attractive).

The limited power of self-fulfilling prophecies

Self-fulfilling prophecies occur when one person's erroneous expectations for a second person cause that second person to behaviorally confirm the originally erroneous expectation (Jussim, 1991; Merton, 1948). Self-fulfilling prophecies constitute a second basis for the common social psychological emphasis on the power of belief to create reality. For example: "The thrust of dozens of experiments on the self-fulfilling prophecy and expectancy-confirmation processes, for example, is that erroneous impressions tend to be perpetuated rather than supplanted because of the impressive extent to which people see what they want to see and act as others want them to act ..." (Jost & Kruglanski, 2002, pp. 172-173). Although such testaments to the power of self-fulfilling prophecies are common (see Jussim, 1991; Jussim & Harber, in press, for reviews), they are not supported by the general pattern of results obtained in naturalistic or experimental studies.

Table 2. Teacher expectations: Self-fulfilling prophecies and accuracy in naturalistic studies

Study	Correlation between teacher expectation and student achievement	Self-fulfilling prophecy effects ^a	Accuracy (correlation minus self-fulfilling prophecy)
Williams, 1976	.47 - .72	.00 - .13	.42 - .72
Brattesani et al., 1984	.74	.26	.48
Jussim, 1989	.36 - .57	-.03 - .18	.36 - .41
Jussim & Eccles, 1992	.50 - .55	.10 - .16	.36 - .49
Trouilloud et al., 2002	.79	.28	.51

^aThese are standardized regression coefficients. Ranges are presented when studies had multiple outcomes.

Naturalistic studies. Table 2 summarizes results obtained in naturalistic studies that were capable of assessing both the accuracy and self-fulfillment of teacher expectations. These studies employed structural equation techniques to determine whether teacher expectations earlier in the school year predicted changes in student achievement (typically, by controlling for earlier student achievement) by the end of the school year (or later). The self-fulfilling effects of teacher expectations ranged from nonexistent to moderate, and, on average, were small (about .15). Other naturalistic studies of teacher expectations yield the same pattern of small effects averaging .1 to .2 (Jussim & Harber, in press). Naturalistic studies of self-fulfilling prophecies in therapy, among college roommates, and among small working groups of MBAs yield a similar pattern (Bertran, 1979; McNulty & Swann, 1994; Swann, Milton, & Polizer, 2000).

Experiments. Meta-analyses of experimental studies also show that self-fulfilling effects of perceivers' expectations are generally modest, averaging about .2 and, except in military contexts, range from 0 to about .3 (McNatt, 2000; Raudenbush, 1984; Rosenthal & Rubin, 1978). A self-fulfilling prophecy effect of .2 means that expectations substantially change the behavior of about 10% of the targets and that they do not substantially change about 90% of targets (see Jussim & Harber, in press, for a detailed example). It is much more common for expectancies to have no effect than to become self-fulfilling.

Accuracy

What is social perceptual accuracy?

Although accuracy has long been controversial within social psychology (Jussim, in press a), it is conceptually a very simple phenomenon. Social perceptual accuracy refers to the correspondence between perceivers' beliefs about targets and what targets are actually like, independent of the perceivers' influence on them (Funder, 1995; Jussim, in press a).

The accuracy of teacher expectations

A simple way to distinguish self-fulfilling prophecies from accuracy under naturalistic conditions is to determine the difference between: (1) simple correlations between teacher expectations and student achievement, and (2) self-fulfilling effects of teacher expectations on student achievement. For example, the correlation between teacher expectations early in the year and student achievement at the end of the school year represents the overall predictive validity of teacher expectations. Predictive validity can come from only two sources, which are both mutually exclusive and exhaustive: (1) teacher expectations cause student achievement (e.g., through self-fulfilling prophecies); and (2) teacher expectations predict, but do not cause, student achievement. Prediction without causation represents accuracy.

The extent to which accuracy dominates self-fulfilling prophecies can be seen in Table 2. Accuracy accounts for about 75% of the correlation between teacher expectations and student achievement; self-fulfilling prophecy, about 25%. In general, teacher expectations predict student achievement primarily because they are accurate, even though there is also reliable evidence that self-fulfilling prophecies occur.

The accuracy of social stereotypes

Definition of stereotype. Stereotypes were once routinely defined as irrational and inaccurate (e.g., Allport, 1954; Brigham, 1971). Such definitions, however, included a tautology that limited their utility. If all stereotypes are inaccurate by definition, then only inaccurate beliefs about groups can be considered stereotypes. What term, then, denotes *accurate* beliefs about groups? Because of these and similar concerns, widespread disagreement emerged regarding

whether stereotypes should be considered inaccurate by definition (Ashmore & Del Boca, 1981).

These problems have been eliminated by contemporary definitions of stereotypes, which are more value neutral and non-tautological. Thus, Ashmore and Del Boca (1981) define stereotypes as beliefs about the attributes of groups and their individual members (see e.g., Fiske & Taylor, 1991; McCauley, Stitt, & Segal, 1980; Ryan, 2002 for similarly neutral definitions). These definitions allow the accuracy of stereotypes to be evaluated in the same manner as schemas, beliefs, and category judgments.

We adopt Ashmore and Del Boca's (1981) agnostic definition. By doing so, the accuracy of any particular belief about a group becomes an empirical question. We do not assume that all stereotypes are accurate; people hold inaccurate beliefs about groups and these can be profoundly damaging. But the existence of some inaccurate beliefs about groups does not, in itself, negate the potential for other stereotypes to be accurate. Just as a scientific hypothesis of an association between two variables does not require a perfect ($r = 1.0$) correlation to be confirmed, neither does a lay belief. In the same spirit as that governing science, people's beliefs about race and sex differences, while not perfect, are often highly valid. We review evidence of such accuracy next.

Group differences are sometimes broadly consistent with stereotypes. Around the world, on average, males are more aggressive than females (Brannon, 1999). In the U.S., Jews are wealthier than other ethnic groups; African-Americans are more likely to be both perpetrators and victims of crime than are others; Asian-Americans are more likely to complete college than are others; and people with lower incomes are less well-educated than are people with higher incomes (Marger, 1994; www.census.gov, 2004). These are all verified group differences, and people who believe in them hold more accurate stereotypes than those who do not.

Stereotypes of African-Americans. McCauley and Stitt (1978) provided the first rigorous examination of the accuracy of people's beliefs about differences between African-Americans and other Americans. These beliefs included the percentage of African-Americans and other Americans who were: high school graduates, born illegitimately, unemployed last month, crime victims, on welfare, parents of four or more children, and in a household headed by a female. Their results provided clear evidence of stereotyping: of 42 possible comparisons, 37 showed that participants perceived Blacks as different from other Americans. Were these perceived differences correct? In all 37 cases of

stereotyping, the direction of the perceived difference was identical to the direction of the actual difference; 20 of the perceived differences were similar in magnitude to the actual differences; and in the remaining 17 cases, participants *underestimated* the extent of actual differences between Blacks and other Americans. Overall, the correlation of the mean perceived difference with the Census difference was .87.

We are aware of only two other studies that have empirically assessed the validity of racial stereotypes (Ryan, 1996; Wolsko, Park, Judd, & Wittenbrink, 2000). These studies used a very different methodology. In both, self-reports of randomly surveyed African-Americans and Whites constituted the criterion, and accuracy was assessed using discrepancy scores (between stereotypes and the target group's self-report). Both found that Whites' stereotypes were quite accurate (although Ryan, 1996, found that African-Americans generally exaggerated the extent to which both Whites and African-Americans fit their group's stereotypes). Wolsko et al. (2000) also found that when people were urged to take group differences seriously (i.e., adopt a "multicultural" perspective rather than a "color-blind" perspective), both their stereotyping and their accuracy increased.

Sex stereotypes. Several studies have demonstrated accuracy in people's beliefs about sex differences. Swim (1994) performed two of the first, in which she: (1) assessed college students' beliefs about the size of sex differences on 17 attributes (aggressiveness, helpfulness, SAT scores, etc.); (2) located every meta-analysis assessing the difference between men and women on these 17 attributes; and then (3) compared the students' gender beliefs to the meta-analyses. Across two studies, the mean perceived sex difference correlated almost .8 with the size of the sex differences revealed in the meta-analyses. Other research also converges on the conclusion that people often have moderately to highly accurate perceptions of sex differences (Diekmann, Eagly, & Kulesa, 2002; Hall & Carter, 1999). Research finding pervasive inaccuracy (Allen, 1995) is unusual.

Stereotypes, bias, and accuracy in person perception

Accuracy in judging differences between individuals from different groups. People may often hold beliefs about differences between groups of individuals that they know personally. For example, perceivers making claims about the differences between the Dutch and British football (soccer) players on their teams, or between the boys and girls in their math classes, are making claims about

differences between small groups. This level of analysis addresses the role of stereotypes in causing systematic inaccuracy in perceivers' judgments about individuals they know personally. Many researchers have emphasized the idea that stereotypes often lead to inaccurate and unjustified judgments of individual targets (e.g., Fiske, 1998; Stangor, 1995). Support for this claim would be obtained by showing that group stereotypes bias judgments of individuals. For example, if sex stereotypes bias coaches' judgments of players' skill, coaches should perceive the skill of the boys as exceeding the skill of the girls by considerably more than is justified by the real skill differences, if any.

Alternatively, the perspective being presented here — that the content of social beliefs largely reflects social reality — suggests a different hypothesis: accuracy in perceivers' judgments of differences between small groups of individuals they know personally should be moderate to high, and bias should be small. Only a handful of studies, however, have addressed the accuracy of people's perceptions of differences and similarities between small groups they know personally. Those studies are reviewed next.

Madon et al. (1998) examined the accuracy of 7th grade teachers' perceptions of their students' performance, talent, and effort at math about one month into the school year. They assessed accuracy by performing the following analyses. First they identified perceived group differences by correlating teachers' perceptions of individual students with students' race, sex, and social class. This assessed whether teachers' systematically evaluated individuals from one group more favorably than individuals from another group. Next, Madon et al. assessed actual group differences in performance, talent, and effort by correlating individual students' final grades from the prior year (before the teachers knew the students), standardized test scores, and self-reported motivation and effort with students' race, sex, and social class. Accuracy was assessed by relating perceived differences with actual differences.

Madon et al. found that teachers were mostly accurate. The correlation between teachers' perceived group differences and actual group differences was $r = .71$. The teachers' perceptions of sex differences in effort, however, were highly inaccurate — they believed girls exerted more effort than boys, but there was no sex difference in self-reported motivation and effort. When this one outlier was removed, the correlation between perceived and actual group differences increased to $r = .96$.

We are aware of only two other studies that have addressed whether people systematically and unjustifiably favor or disparage individuals belonging to certain groups (Clarke & Campbell, 1955; Jussim, Eccles, & Madon, 1996).

Both yielded evidence of accuracy accompanied by small bias. All three studies (including Madon et al., 1998), however, were conducted in educational contexts — Jussim et al. (1996) addressed teachers' perceptions of students, and Clarke and Campbell (1955) addressed students' perceptions of one another. It remains an open, empirical question whether this pattern of accuracy and small bias in perceptions of demographic differences between individuals with whom one has extended contact is unique to classrooms, or characterizes social perception more broadly.

Does relying on stereotypes increase or reduce the accuracy of social judgment? Much of the social psychological scholarship on stereotypes and person perception has been written as if any effect of target category constitutes a source of inaccuracy and error in judgment (e.g., Fiske, 1998; Jones, 1986). If the stereotype is inaccurate, then using it to judge others will reduce accuracy (as Madon et al. (1998) demonstrated regarding sex stereotypes and teachers' perceptions of students' effort). Both common sense and normative models of decision-making (Kahneman & Tversky, 1973) indicate that reliance on an inaccurate expectation, stereotype, or base-rate should reduce accuracy. We are not contesting this conclusion.

The suggestion that any reliance on stereotypes constitutes a source of inaccuracy, however, is not justified. Judgments under uncertainty are properly influenced by base-rates (e.g., Kahneman & Tversky, 1973). Stereotypes are frequently viewed as subjective base-rates (e.g., McCauley et al. 1980; Wolsko et al., 2000). This suggests that when the stereotype is accurate, and when individuating information does not provide complete information relevant to the judgment, perceivers will be more accurate if they use rather than ignore base-rates. Only a handful of studies, however, have addressed this issue, and they are discussed next.

The utility of an accurate stereotype was demonstrated by Brodt and Ross (1998). College students made predictions about the behaviors and preferences of other college students who lived in one of two dormitories. The students in the "preppie" dorm were widely seen as politically conservative, wealthy, and conventional. The students in the "hippie" dorm were widely seen as politically leftwing with unconventional practices and preferences. Perceivers (other students who did not live in either dorm) viewed photographs of individual targets, were informed of each target's dorm, and then made predictions about each target's behaviors and attitudes. Perceivers' predictions were then compared to the targets' self-reports on these same preferences and attitudes.

When perceivers predicted targets to be consistent with their dorm (for a preppie dorm resident to have preppie attributes or for a hippie dorm resident to have hippie attributes), 66% of their predictions were correct (they matched the targets' self-reports). When perceivers jettisoned their dorm stereotypes, and predicted targets to be inconsistent with their dorm, 43% of their predictions were correct. Relying on the preppie/hippie dorm stereotypes enhanced the accuracy of person perception predictions. Three other studies found that, except when the stereotype was manifestly false, relying on a stereotype increased rather than reduced accuracy (Cohen, 1981, experiment two; Jussim, et al. 1996; Madon et al., 1998).

Individuating information. There are limits to the utility of even accurate stereotypes. Individuating information gleaned over time should produce a more accurate impression than will stereotypes. People seem to know this, and usually base their judgments far more on individuating characteristics, when such information is available, than on stereotypes (see, e.g., Kunda & Thagard's (1996) meta-analysis).

Reinterpreting studies of bias: The goodness of judgment index

Deviation from perfection versus improvement over uselessness

In most studies of judgment and decision-making, inaccuracy or bias is defined as deviation from perfection (whether perfection means zero difference between experimental groups or deviation from predictions of a normative model — e.g., Darley & Gross, 1983; Kahneman & Tversky, 1973). Yet perfection is so high a standard that researchers rarely apply it when testing their own theories and hypotheses. In social psychology, effect sizes rarely exceed r 's of about .3 (Richard, Bond, & Stokes-Zoota, 2003). Nonetheless, researchers routinely (and justifiably) interpret such effects as validating their hypotheses.

The goal of establishing how well a model performs, rather than determining whether it significantly deviates from perfection, is explicit in several goodness-of-fit indices used to test structural equation models. One of the earliest tests of model quality was the chi-square, which evaluated whether the hypothesized model significantly deviated from perfection (an exact accounting of all covariances). With large samples, the chi-square was usually significant, which led to rejection of highly valid models and measures. To correct this problem, researchers developed measures of fit, such as the *Normed Fit Index* (Bentler

& Bonett, 1980), that indicate how much explanatory power a model achieves, rather than whether the model significantly deviates from perfection.

The Goodness of Judgment Index

In the same spirit, Jussim (in press b) proposed a *Goodness of Judgment Index* (GJI) for studies of error and bias. The GJI is simply:

$$\frac{\text{maximum possible imperfection} - \text{actual degree of imperfection}}{\text{maximum possible imperfection}}$$

"Maximum possible imperfection" is the most anyone could possibly be wrong under the circumstances. "Actual degree of imperfection" is how wrong the participants actually were.

Imperfection can be operationally defined as errors, discrepancies from predicted values, disagreements among perceivers, and so forth.

The GJI is simple to use and indicates the proportion of improvement of social judgment compared to complete error or bias. Scores above .5 mean that the judgment is closer to complete accuracy or agreement; scores below .5 mean that the judgment is closer to complete error or disagreement.

Reinterpretation of Rosenhan (1973)

The value of assessing accuracy via the GJI is apparent when applied to Rosenhan's 1973 "On Being Sane in Insane Places" study, which has long been cited as a classic example of the power of labels and expectations to bias judgment. Eight pseudo-patients (confederates who had no history of mental illness) were admitted to psychiatric hospitals after (falsely) complaining of auditory hallucinations. Upon admission, they immediately ceased complaining of symptoms of mental illness.

Pseudo-patients were kept from 7 to 52 days, with a mean length of stay of 19 days. None were diagnosed as sane. All were released with a diagnosis of schizophrenia "in remission." Furthermore, staff sometimes interpreted reasonable behavior as symptomatic of pathology (e.g., pacing halls from boredom as anxiety). Rosenhan (1973, p. 257) believed he had shown that "... we cannot distinguish insanity from sanity."

Although these data are not subject to re-interpretation by the GJI, they do provide more evidence of reasonableness than typically acknowledged. First, *the pseudo-patients were admitted complaining of auditory hallucinations.* If the

Conclusions

Why accuracy matters

Because accuracy research can advance behavioral science and address important social problems, it serves two central social psychological goals:

Scientific generativity. Potentially rich areas for future research involve identifying the situational and individual factors that determine when people will display greater or lesser social acuity in their perceptions of groups and individuals (as some have already begun to do — Hall & Carter, 1999; Kenny, 1994; Wolsko et al., 2000). Furthermore, fundamental questions about social perceptual processes can be addressed at the intersections between social psychology and other domains in which accuracy has long played an important role, such as perception and memory (Koriat, Goldsmith, & Panksy, 2000).

Identifying and correcting inaccurate stereotypes. Inaccurate stereotypes cause damage (Fiske, 1998). However, identifying inaccurate beliefs about groups requires distinguishing them from accurate beliefs about groups. Furthermore, the success of interventions intended to correct inaccurate stereotypes can only be determined by assessing the accuracy of the social beliefs that follow such interventions.

Making the social mind: Social reality as the major source of social beliefs

Whether social cognition is fundamentally rational and accurate or fundamentally inaccurate and biased has been controversial for decades. Perspectives emphasizing error, bias, and the ways in which social beliefs create social reality have dominated the literature on social cognition (e.g., Fiske, 1998; Jones, 1986; Kahneman & Tversky, 1973; Nisbett & Ross, 1980; Snyder, 1984). These views have created an image of a social perceiver whose misbegotten beliefs and flawed processes construct not only illusions of social reality in the perceiver's own mind, but actual social reality through processes such as self-fulfilling prophecies. In this bleak view, the mind becomes primarily a product of cognitive shortcomings and distorted social interactions.

This view is not justified by the data. Although people undoubtedly commit errors and biases, and are rarely perfectly accurate, almost none of the literature routinely cited as testaments to the power and prevalence of error and bias actually tests for accuracy. Consequently, despite the manner in which it is cited, that literature provides little direct information about accuracy. Furthermore,

pseudo-patients had not been lying, such complaints would suggest something seriously wrong. Second, most were released in about two weeks (excluding the 52 day outlier). Given that the pseudo-patients had been admitted presenting a psychopathic episode complete with hallucinations, this stay does not seem excessive.

The GJI can, however, help reinterpret a follow-up study Rosenhan (1973) conducted. Rosenhan identified a hospital whose staff doubted that they would misdiagnose patients' sanity. He then informed them that pseudo-patients would attempt to gain admission to their hospital during the upcoming three months. Psychiatrists were asked to rate the 193 new patients admitted during this period. Rosenhan (1973, p. 252) described his results this way: "Twenty-three [pseudo-patients] were considered suspect by at least one psychiatrist. There were, however, no pseudo-patients."

To compute the GJI, we gave Rosenhan the benefit of the doubt, and assumed that *all* of the psychiatrists wrongly identified the 23 authentic patients as confederates. To keep the math simple, we have assumed that there was only one psychiatrist (this produces the same GJI as assuming two of two, three of three, etc. identified the 23 patients as pseudo).

The GJI then becomes:

$$\frac{(193 \text{ possible errors} - 23 \text{ actual errors})}{193 \text{ possible errors}} = .88 \text{ accuracy}$$

The psychiatrists were right 88% of the time, based on our starting assumptions favoring bias and error. If we assume that only half, rather than all, of the psychiatrists identified these 23 patients as pseudo, the GJI goes up to .94. The conclusion that the sane are *sometimes* indistinguishable from the insane is justified by Rosenhan's studies. However, neither Rosenhan's conclusion that the insane are indistinguishable from the sane, nor the longstanding interpretation of this study as a testament to the constructive power of labels, are justified. When applied to other influential classics (e.g., Hastorf & Cantril, 1954), and to more recent research (Monin & Norton, 2003), the GJI has yielded values over .6 every time — and often yields values of about .9.

meta-analyses show that much of the literature routinely cited as demonstrating powerful self-fulfilling prophecies and expectancy-maintaining biases actually demonstrate effects that are best characterized as weak or modest.

Space did not permit us to review many programs of research demonstrating accuracy (e.g., Funder, 1995; Kenny, 1994). We intentionally focused on areas that have long been renowned for supposedly demonstrating the power of error, bias, and social and cognitive constructivism precisely because *even those areas* typically provide far more evidence of reasonableness and accuracy than they do of error, bias and constructivism.

The content of the human mind is undoubtedly socially constructed to some degree, and in ways not addressed in this paper or by much social psychology generally (upbringing, socialization, culture, etc.). But it is also evident that, if the criterion is the actual results of social psychological research (and not necessarily how those results have been discussed), social reality influences the content of the mind far more than the content of the mind constructs or creates social reality.

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How to do things with logical expressions

Creating collective value through co-ordinated reasoning

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We argue that logical expressions in human language enable speakers to perform particular acts as well as stating propositions which may be true or false. We present a conversational action planning model of co-ordinated reasoning, which we use to predict choice of logical expressions in situations in which two people co-operate in the face of risk and uncertainty. We first show how this model predicts preferences for formulations of conditional directives where a principal instructs an agent on how to behave in a hypothetical situation. Second, we show how this model accounts for choices of quantity and probability expressions that express risk, in situations where a professional advises a client on her options. We conclude that the pragmatic signals encoded in human logical vocabulary can facilitate the co-ordination of social interaction through aiding mutual recognition of intentions on joint projects where collaboration is likely to create value.

Keywords: logic, conversation, conditionals, quantifiers, probability

In 1776, the eminent economist and philosopher Adam Smith pointed out the importance of the division of labour for modern society: Without humans' capacity for specialising in tasks and collaborating with strangers, humankind would not enjoy anything near the success that it does. Somehow, without any explicit direction or centralised planning, human societies seem to be able to self-organise and re-organise into ever more successful economic and social arrangements (Seabright, 2004). Human societies thus seem to be able to make "collective minds" that maximise collective benefits for groups and enable them to prosper. How are such co-ordinated actions possible when many of the agents involved have never met in a face-to-face encounter?