Third student, concluding sentence: "I guess that we are probably irrational and spend our lives trying to convince ourselves that we are rational."

This testifies to just how little insight social psychology has provided into how people do things well.

K&F have made many profound points, and I would like to augment one. Specifically, they highlighted how, in most studies, accuracy or rationality is the null hypothesis. It is, therefore, impossible to obtain evidence of accuracy or rationality, because it is impossible to "confirm" the null hypothesis. They are right about this, but there is another problem with null hypothesis testing in such research. The statistical comparison is usually deviation from perfection (whether that perfection means zero difference between experimental groups or deviation from predictions of some sort of normative model).

Unfortunately, however, perfection is so high a standard that researchers rarely apply it when testing their own models, theories, and hypotheses! If the results confirm the hypotheses on two out of three dependent variables in Study One; and then reappear on three out of four dependent variables in Study Two, the paper will most likely get published and the tone will emphasize confirmation of the author's theory.

This situation is explicit in use of goodness-of-fit indices when testing structural equation models. One of the earliest tests of model quality was the chi-square test, which evaluated whether the correlations or covariances predicted by the hypothesized model significantly deviated from the observed correlations. With large samples, the chi-square is almost always significant, however, indicating that almost all hypothesized models are imperfect. It is not often very useful, however, to know that one's proposed model is not perfect. Typically, we want the model to be good, not perfect.

This inspired some researchers (e.g., Bentler & Bonnett 1980) to develop measures of fit that indicate how much the model does explain. One common fit measure is the Normed Fit Index (NFI). For the NFI, one assesses the improvement in fit obtained in one's hypothesized model, as compared to that of the null model – one which assumes no variable is related to any other variable. The NFI is computed by:

$$\frac{(\text{chi-square[null model]}) - (\text{chi-square[hypothesized model]})}{(\text{chi-square[null model]})}$$

If the hypothesized model has a chi-square of 80, and the null model has a chi-square of 1,000, the NFI equals .92. The model may be significantly worse than perfect, but this result can be metaphorically interpreted as meaning that it accounts for about 92% of the covariances among the observed variables.

In the same spirit, I propose a Goodness of Judgment Index (GJI) for studies of error and bias. Most results in studies of judgment, decision-making, and prediction can be readily translated into a 0–1 scale, because such studies use frequencies, percentages, or correlations as their basis for identifying error and bias. The GJI then becomes:

$$\frac{(\text{Maximum possible imperfection} - \text{actual degree of imperfection})}{\text{Maximum possible imperfection}}$$

"Maximum possible imperfection" is the most anyone could possibly be wrong under the circumstances. Imperfection can be operationally defined as errors, discrepancies from predicted values, discrepancies from perfect correlations, and so forth.

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

Consider the following data from a recent study on bias in social perception (Monin & Norton 2003). During a community water crisis, Princeton students were asked to stop showering for about two days. The researchers surveyed Princeton students, and asked them: (1) How many showers they took during the ban; and (2) what percentage of other Princeton students showered during the ban. I only focus on Day 3 of their results, although the basic pattern holds throughout. During Day 3 of the ban, 47% of their respondents admitted to taking showers. Bathers predicted that 66% of Princeton students took showers; nonbathers predicted that 47% of Princeton students took showers. Interpretation of the results focused almost entirely on error and bias.

Their results, however, provided more evidence of accuracy than of bias. One does not need the GJI for the nonbathers – their prediction of the proportion of bathers was dead-on accurate (47%), and their GJI would be 1.0. Even the predictions of the bathers were more rational than irrational. Because 47% of the students bathed, the greatest possible imperfection would be 53% (which would occur if 100% of the students were predicted to bathe). The observed imperfection among bathers is 66% – 47% = 19%. GJI = (.53 – .19)/.53 = .64. So, the bathers' judgments, which clearly showed a false consensus effect, were closer to complete accuracy than complete inaccuracy.

I hope that K&F's article inspires researchers studying bias to develop tools to estimate, not just the degree to which people make biased and irrational judgments, but also the degree to which they make unbiased and rational judgments. When data are consistently presented in a balanced manner, we will have taken a major step toward a balanced social psychology.

Building an even better conceptual foundation

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Abstract: Krueger & Funder (K&F) spend too much time on their critique of some classic studies in social psychology. They should have spent more time developing their constructive ideas about better methodologies and, especially, better conceptual foundations for the field. We endorse their exhortation to consider social behavior in its ecologically adaptive context, and we present a few ideas of our own about how to develop a more comprehensive conceptual framework.

Krueger & Funder (K&F) are unhappy with two traditions of research in social psychology. They provide a biting and occasionally witty critique of classic demonstrations of misbehavior (over-conformity, over-obedience, and failures to help) and the heuristics and biases approach to social cognition. Many of their insights into weaknesses of these approaches have merit, although their relentlessly negative perspective vastly undervalues the enormous positive contributions of research from these traditions. Any school of behavioral research can be subjected to scathing criticism; indeed, the authors' own *Realistic Accuracy Model* is also limited in many ways.

Acknowledging that there is something to learn from a critical evaluation of these major pillars of the social psychological canon, we are more interested in K&F's affirmative suggestions for improvements in methods and theory. Most of their suggestions are methodological, and we have already expressed our enthusiasm for the correspondence framework for the analysis of degrees of accuracy (see Hastie & Rasinski 1987, for an introduction to the correspondence–coherence distinction, a discussion of "methodological logics" for judgment research, and a comment on the manner in which the null hypothesis test has obstructed the study of social judgment). And, like K&F, we find the Bayesian framework to be conceptually superior to the Neumann-Pearson null

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hypothesis testing approach. But, their essay does not help us understand the persistent popularity of the traditional approach. Perhaps, there is an important lesson to be learned from the failure of the Bayesian approach to catch on in any major scientific field.

Because we are in essential agreement with K&F's methodological imperatives, we would like to focus our attention on their suggestions for a stronger conceptual foundation for the field of social psychology. K&F view social behavior as central to human adaptation. They argue that it is essential to place social cognition in an interpersonal context and to evaluate its overall adaptive success by a cost–benefit analysis. For example, referring to Funder's (1995) and Kenny's (1994) frameworks for social judgment and personality perception, K&F emphasize that social interactions are an ecologically indispensable ingredient of social cognition. Social interactions determine what types of information are available and relevant to a perceiver, and prescribe the appropriate standards of accuracy by which to evaluate social judgment. K&F also note that in the two traditions they criticize, "The paradigmatic study presents social stimuli directly to participants, thus bypassing relevance and availability completely, and bypassing the task of cue detection. Traditional studies of social cognition concern the utilization stage exclusively" (sect. 4.3.3.2, para. 4).

We agree that considering interpersonal processes is essential to a more ecologically balanced picture of social behavior and cognition. But, we believe that K&F's recommendation about how to salvage social psychology still does not effectively banish the ubiquitous bias toward the study of "individual minds operating in a social vacuum," which has haunted cognitive social psychology. For example, Funder's Realistic Accuracy Model does not consider the rich context of multiple, partially redundant, substitutable social cues. (Why else would they say that "accuracy is a difficult and remarkable achievement" [sect. 4.3.3.2, para. 4] and indicate that the level of accuracy can be predicted by a simple multiplicative calculation?) Nor is it clear where the promised cost–benefit analysis fits into the framework (see their Fig. 2). General criticisms of such individual-focused frameworks have been raised elsewhere (e.g., Nye & Brower 1996), and we will not repeat them. Instead, let us sketch our conception of a more comprehensive framework for social interdependence that extends K&F's suggestions for a more balanced social psychology.

Everyone agrees that the ultimate goal of social psychology is to provide insights and causal theories of everyday social behavior. No social psychologists question this truism. But "social" seems to mean different things to different social psychologists. For some, "social" means being motivated by the immediate *social policy* implications of the research findings. K&F suggest that this motivation is one reason for the emphasis on biases and social misbehavior in some textbooks (cf. Katzko 2002). For others, like K&F, "social" means that the stimulus that is being perceived and judged is another human being; the most social aspect of the framework is an analysis of the agreement and/or disagreement between two perceivers of a target person. And for still others (including us), "social" means adaptive, strategic interaction in a matrix of enduring and shifting social relationships.

The perceiver–target framework is too limited, and it excludes important factors of social motivation and strategic interaction. Without a broader theory of motivation and social interdependence, we fear research will simply continue to produce lists of "effects" and "biases," which under some conditions *may* materialize in interpersonal perception (cf. Table 1 of the target article). Although K&F do not acknowledge it, the heuristics and biases approach to social cognition did more than simply catalogue biases and errors. The underlying conception of the mind, implicit in this approach, includes a "cognitive toolbox" architecture with optional reliance on alternative heuristic judgment strategies. The strategies are associated with fundamental cognitive capacities (memory retrieval, similarity evaluation, causal simulation) that are responsible for the distinctive signature biases that are byproducts of reliance on each strategy (cf. Kahneman & Frederick 2002). Even some of the harshest critics of the heuristics and biases approach have adopted this basic conceptual framework (e.g., Gigerenzer et al. 1999). But, a cognitive architecture is only part of a comprehensive conceptual framework (cf. J. R. Anderson 1990; N. H. Anderson 1996).

We think that K&F's recommendation to consider the *ecological context* of social behavior should be taken more seriously. Only a few social psychologists have grappled with the adaptive character of social interactions. Indeed, we see little evidence that K&F have seriously addressed these issues. However, this challenge has been accepted by behavioral ecologists who study animal behavior (e.g., Dawkins & Krebs 1978; Hauser 1996). Interaction and communication among animals are often deceptive and manipulative, as well as cooperative. And, even some of the most mysterious animal social behaviors can be understood as solutions to the adaptive problems of securing essential resources, such as food, mating opportunities, social power, and so forth (Byrne 1995). This is no different for humans! Game theory and Evolutionary Game Theory provide truly comprehensive frameworks for understanding the adaptive essence of social interaction (e.g., Gintis 2000; Maynard-Smith 1982). These approaches come with powerful analytic and simulation tactics for theory building, as well as original observational and experimental methodologies. More than 25 years ago, Kelley and Thibaut (1978) attempted to introduce social psychologists to Game Theory, but their effort was unsuccessful. We think social psychology has made a major error by myopically ignoring these important and productive approaches. Without more comprehensive foundations, frameworks like the Realistic Accuracy Model will continue to generate superficial lists of "descriptive patterns," but miss deeper insights into the causes of social behavior.

We can point to a few illustrations of the kind of research we advocate. Camerer (2003) provides an accessible and profound introduction to the aspects of Game Theory most relevant to social psychology (and reading Kelley & Thibaut 1978, is still instructive). Kameda et al. (2003) report on an example study of the development of adaptive social norms, and Kameda and Nakanishi (2002; 2003) report on cost–benefit analyses of social conformity. We applaud K&F's goal of promoting the development of a balanced social psychology. But, we want to exhort social psychologists to take their adaptive theme further. Even limited target–perceiver theories, like the Realistic Accuracy Model, need a more comprehensive foundation that deals with interdependencies among social agents.

One path to balance and order in social psychology: An evolutionary perspective

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Abstract: Consideration of the adaptive problems faced by our ancestors suggests functional reasons why people exhibit some biases in social judgment more than others. We present a taxonomy consisting of six domains of central social challenges. Each is associated with somewhat different motivations, and consequently different decision-rules. These decision-rules, in turn, make some biases inherently more likely to emerge than others.

Social psychologists do often seem obsessed with listing the cute and unconnected stupid errors that people make. There may be reasons for the perennial focus on the negative and unexpected, but we agree that this focus has (1) made it difficult to see the overarching functions underlying these biases and "mistakes," and (2) hindered the development of integrative theories of social bias.

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