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# Collective estimation: Accuracy, expertise, and extroversion as sources of intra-group influence ☆

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**Abstract**

Although estimations typically possess correct answers, these answers may be difficult to demonstrate to others. However, providing external information may increase their demonstrability. In this experiment, individuals ($N = 60$) and 6-person groups ($N = 360$) generated estimations with or without frames of reference. We hypothesized that estimations involving frames of reference would be best fit by models predicting intra-group influence based on the accuracy of alternatives or of members in general. Conversely, we hypothesized that estimations not involving frames of reference would be best fit by models predicting influence based on member extroversion or proposal centrality. Results indicate that groups outperformed individuals and that estimations generated in the presence of frames of reference were superior to those generated in their absence. Accuracy and expertise schemes provided the best fit when frames of reference were provided, whereas an extroversion scheme provided the best fit when they were not.


*Keywords:* Group decision-making; Social decision schemes; Intra-group influence; Social permutation

What is the current demand for a new product? How many scholarly papers will a newly hired professor produce over the next five years? How long would it take for a person to drive from Anchorage to Los Angeles? These questions have in common that they all involve the process of estimation. Estimations are called for in a variety of contexts, both individual and collective. However, group judgments are often preferred to individual judgments for a number of reasons, including the perception that groups are more accurate than individuals (Gigone & Hastie, 1997). Given this bias, understanding the group estimation process is of clear relevance to social science and to organizations. This paper focuses on how groups go about generating consensus on estimations. Our specific focus is on how the proposals of different members receive differential weight in a group estimation as a function of available information (i.e., frames of reference). We propose that group estimations made in more concrete circumstances (i.e., when a frame of reference is given) lead to reliance on more accurate proposals and members. We also propose that estimations generated in more ambiguous circumstances (i.e., when a frame of reference is not provided) lead to reliance on the preferences of extroverts or, alternatively, more typical (central) member proposals.

## Collective estimation

In their review of the literature, Stasser and Dietz-Uhler (2001) assert that cooperative group tasks can

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be meaningfully distinguished on two dimensions: selection tasks vs. rating tasks and intellective tasks vs. judgmental tasks. The first of these distinctions is relatively straight-forward. Decision-making groups are typically in a position where they are called upon to either choose an option or options that are most attractive in some way (e.g., "who is the best job candidate?") or, alternatively, to evaluate some target on a continuous variable (e.g., "how much money should we offer this job candidate?"). Thus, this distinction is a function of the response format imposed on the task either by an external agent or by the group members themselves. However, it is important to note that these task types may also differ substantially in terms of their purpose and function within the group.

Group tasks also vary along a continuum anchored by intellective and judgmental tasks (Laughlin, 1980), with intellective tasks being defined as those involving high levels of demonstrability and judgmental tasks being defined as those involving low levels of demonstrability (Laughlin & Ellis, 1986). According to Laughlin and Ellis, for a task to have a demonstrable solution, four conditions must be satisfied: (1) group members must share a conceptual system, (2) members must have access to sufficient task-related information, (3) members who do not know the correct answer to the problem must be capable of recognizing and accepting the correct answer if it is introduced, and (4) members who are aware of the correct answer must be willing and able to share this information with other group members.

According to the framework offered by Stasser and Dietz-Uhler (2001), collective estimation is considered to be an intellective rating task. This distinguishes collective estimation from judgmental selection (i.e., choice), judgmental rating (i.e., judgment), and intellective selection (i.e., problem-solving). However, given that the intellective judgmental continuum is, truly, a continuum; the intellectiveness of any given task may increase or decrease as a function of many different factors. Although correct answers to estimations may exist, the conditions promoting demonstrability may be absent. Even though group members generating estimates may share the necessary basic conceptual systems to communicate meaningfully (e.g., notions of distance and weight); more complex conceptual issues (e.g., population statistics and economic trends) may not be sufficiently understood by all members, at least initially. To compound this predicament, problem solvers often find themselves in situations involving scarce information. For example, if a problem solver were trying to estimate the weight of the average American male, this estimate might be easier to generate given other related information (e.g., the weight of the average American female). A lack of shared understanding along with the problem presented by information scarcity may make it difficult both to generate and to defend estimates in a group context.

Laughlin and colleagues (Laughlin, Bonner, Miner, & Carnevale, 1999b; Laughlin, Gonzalez, & Sommer, 2003) found that providing groups with frames of reference, in the form of meaningful informational cues, increased estimation accuracy. In this context, these frames of reference take the form of information related to the quantity being estimated. For example, an estimator may be given the information that the Nile River is 4157 miles long and then be asked to estimate the length of the Mississippi River. Thus, frames of reference as used in this paradigm differ from anchors in the classic work on anchoring and adjustment (e.g., Tversky & Kahneman, 1974) in that the former are intended to provide useful information whereas much of the work in the latter area focused on the degree to which anchors could bias judgments in one direction or the other. For example, in an anchoring study participants might be asked to judge whether Ghandi lived to be over 140 years old before being asked to estimate the age at which he died (providing a positive bias) or, alternatively, to judge Ghandi's age at death after first judging whether he lived to be over 9 years of age (providing a negative bias) (Strack & Mussweiler, 1997).

Laughlin and colleagues (1999b) argue that providing a frame of reference for an estimation results in the estimation taking on the characteristics of what Hastie (1986) refers to as a "world knowledge problem." That is, a problem that is embedded in a larger conceptual system. This, in turn, leads to an intellective shift in the task. Frames of reference may simultaneously increase estimators' understanding of the concepts underlying estimations and the amount of relevant information readily available to them. These effects in turn enhance the ability of group members to meaningfully evaluate the merit of member inputs.

## Intra-group influence

In a typical group estimation setting, a collection of individuals bring their knowledge and expertise together with the goal of reaching an answer that is in some way optimal. The process by which groups go about generating a single collective response from a collection of member preferences has historically been of great interest to social scientists. Although research in this area has taken many forms, two broad categories include the social combination approach (e.g., Davis, 1973; Laughlin, 1999; Lorge & Solomon, 1955; Smoke & Zajonc, 1962; Thomas & Fink, 1961), which treats group members as being indistinct and interchangeable, and the social permutation approach (e.g., Baumann & Bonner, 2004; Bonner, 2000, 2004; Bonner, Baumann, & Dalal, 2002; Kirchler & Davis, 1986), which treats group members as unique entities. Both approaches provide useful tools for modeling group decision processes. The funda-