COMPETENCE, WARMTH, AND EXPECTATIONS: AN INTEGRATION OF STATUS CHARACTERISTICS THEORY AND THE STEREOTYPE CONTENT MODEL

by

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ABSTRACT

Over the last fifty years, researchers in Status Characteristics Theory (SCT) have conclusively demonstrated that within task groups, status differences between members influence the emergence of a power and prestige hierarchy within the group. According to the theory, this is accomplished through the activation of stereotypical expectations of group members' abilities. However, relatively little research has directly examined the cognitive process associated with expectation formation. During this same period, scholars within diverse subfields of psychology have suggested that there are two fundamental dimensions along which social judgments are made. These two dimensions have been referred to by various names, including instrumentality and expressivity, agency and communality, and competence and warmth. The most recent exploration of this idea can be found in the field of cognitive science as part of the Stereotype Content Model (SCM). The purpose of the current research is to integrate the basic propositions of SCT with the cognitive process outlined in SCM. In doing so, I hope to situate SCT within an expansive body of existing research, while suggesting a number of potentially useful directions for future research in SCT.

Introduction

In the 1950s, Joseph Berger and his colleagues proposed a set of ideas that would become the Expectations States research program. The original intent of the program was to explain the patterns of interaction among homogenous groups uncovered by Robert Bales (Correll and Ridgeway 2003). Specifically, Bales found that in task groups whose members were initially undifferentiated, inequalities in participation, influence, and prestige emerged over the course of interaction (referred to as a power and prestige hierarchy). This hierarchy is evident in the amount of time members talked, the evaluations of their ideas, their likability, leadership potential, and a number of other variables. Berger was interested in how this group differentiation came to exist and the relationship between inequalities in participation and relative power and influence. In order to explain this emergent structure, Berger developed the concept of *expectation states*, "a social actor's stable anticipation of relative behavioral capacity among two or more actors" (Wagner and Berger 2002). Over the course of interaction, Berger (1958) theorized that individuals would develop expectations of general competence for themselves and other group members. Pair-wise comparisons between group members subsequently produce a hierarchy of expectations, which results in a power and prestige hierarchy consistent with those expectations. Over the next two decades, these ideas were expanded into four related but distinct theoretical branches (Wagner and Berger 2002). The first, which is most similar to Berger's initial theory, is referred to as *Power and Prestige Theory*. This theory focuses on the emergence of a power and prestige

hierarchy during the course of interaction. The second branch and focus of the research described below is *Status Characteristics Theory*, which utilizes the expectations associated with observable differences in status-valued characteristics to explain how a power and prestige hierarchy can emerge prior to group interaction. The *Status Value Theory of Distributive Justice* is the third branch, which addresses expectations of rewards for group members and under what conditions these rewards are perceived as just or unjust. The final branch of the program is *Source Theory*, which explores how evaluations of group members by those outside the group (e.g. a supervisor) influence the expectations that group members have of each other. Over the last forty years, the Expectation States research program has continued to develop and expand. In addition to elaborations of the theories, a number of extensions into new domains and integrations within the program have occurred (see Wagner and Berger 2002 for a summary of some of this work).

Of the four initial branches of the research program, Status Characteristics Theory (SCT) has received the most attention and development. Two of these developments have been particularly important. First was the creation of a standard experimental setting in the early 1960s (as described in Berger 2007). This protocol allows for the manipulation of status information and the measurement of its effects on influence (an indicator of power and prestige). The adoption of a standard experimental design allowed for fruitful comparisons across studies, as well as the ability to conduct meta-analyses on the entire body of empirical findings. The second development was the introduction of an

elaboration by Berger, Fişek, Norman and Zelditch in 1977 (often referred to as the "graph formulation"). Among other contributions, this version of the theory presented a formal description of the cognitive processes involved in expectation formation, as well as the conditions under which these expectations would be salient to the production of a group power and prestige hierarchy. In addition, a graphical presentation of the theory was developed, allowing for precise numerical calculations of expectations for any number of status characteristics and actors.

In a 2002 paper, Berger, Ridgeway, and Zelditch suggest that the general behavioral expectations associated with status characteristics may be usefully conceptualized as complementary expectations of instrumentality and expressivity. The work presented here is an attempt to incorporate this idea into the graph formulation of SCT. First, the propositions of SCT and potential limitations of the current presentation of the expectation formation process will be discussed. Next, the work on warmth and competence by Susan Fiske and her colleagues, which has explored the nature of social judgments formed as a result of observable status characteristics is presented. This work from cognitive psychology informs the reconceptualization of expectation formation in SCT's graph formulation. Three experiments are performed to test the validity of the new formulation and the effect of directly manipulating warmth expectations. Finally, potential directions for future theoretical, empirical, and applied work are discussed.

Status Characteristics Theory

In its simplest form, Status Characteristics Theory (SCT) has the following form:

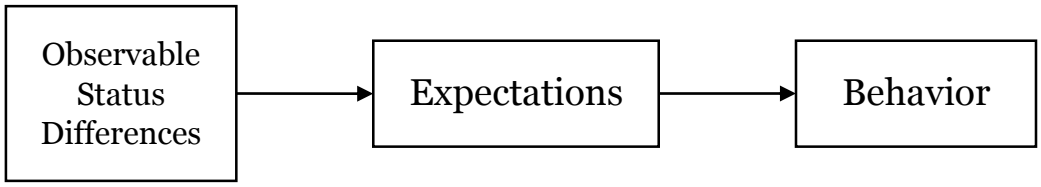


Figure 1. Status Characteristics Theory

SCT describes a *status organizing process*, by which "differences in cognitions and evaluations of individuals or social types of them become the basis of differences in the stable and observable features of social interaction" (Humphries and Berger 1981:954). Specifically, SCT attempts to describe the emergence of a power and prestige hierarchy in collectively-oriented and task-focused groups whose members are differentiated by status characteristics. The characteristics of the group task (*T*) are explicitly defined as scope conditions of the theory:

1. *T* is *evaluated*. There are outcome states of the task that are defined by the members of the group as "success" and "failure". Equivalently, one outcome is positively evaluated, indicated by *T*(+), and one negative evaluated, indicated by *T*(–).
2. The actors are assumed to believe that there exists a particular characteristic *C** that is instrumental to the group task. If an actor possesses the positively evaluated state of *C**, he expects or is expected

to attain the success outcome of the task, $T(+)$, while if he possesses the negatively evaluated state, he expects or is expected to achieve the failure outcome of the task, $T(-)$.

3. *T* is *unitary*. If *T* consists of more than one subtask, we assume that all subtasks have the property that the same instrumental characteristic C^* is relevant to each subtask.
4. *T* is *collective*. It is both necessary and legitimate for each actor to take the behavior of the others into account in solving *T*.

The central concept to SCT is that of *expectations*; these take the form of induced cognitive elements theorized to emerge during group interaction, such as relative expectations of abstract task ability and general expectations of competence.

According to SCT, there are two distinct forms of status characteristic: specific and diffuse.[1]

DEFINITION 1 (Specific Status Characteristic)

A characteristic *C* is a *specific status characteristic* if and only if

1. There are multiple states of the characteristic.
2. There is status value culturally associated with states of the characteristic.
3. There exist attributions of specific capacities associated with states of the characteristic.

[1] The definitions given are adapted from Berger, Ridgeway, and Zelditch (2002).

DEFINITION 2 (Diffuse Status Characteristic)

A characteristic *D* is a *diffuse status characteristic* if and only if

1. There are multiple states of the characteristic.
2. There is status value culturally associated with states of the characteristic.
3. There exist attributions of specific and general capacities associated with states of the characteristic.

While both specific and diffuse status characteristics are associated with specific capacities, only diffuse status characteristics include beliefs about general capacities. For example, mathematical ability is considered a specific capacity, while intelligence would be seen as a general capacity. SCT asserts that possession of a discriminating status characteristic within a group activates congruent performance expectations for group members. When expectations are not explicitly activated[2], this is accomplished through the "Burden of Proof Completion Process" assumption of the theory. This assumption describes a cognitive process by which status comes to be associated with differential expectations of task success. For diffuse status characteristics, this process can be represented as follows (graph theory was incorporated into SCT by Berger, Fişek, Norman, and Zelditch Jr. in 1977):

[2] An example of explicit activation would be a teacher telling their students that boys are better than girls at math.

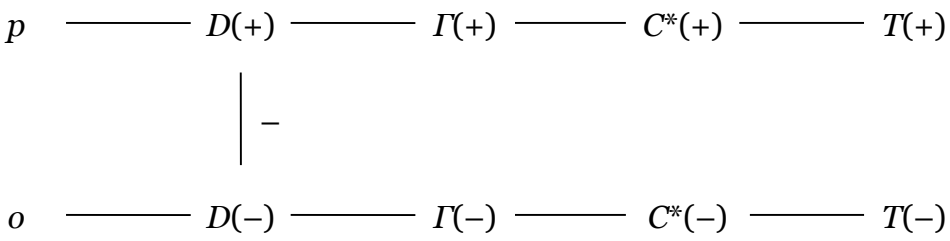


Figure 2. Burden of Proof for Diffuse Status Characteristics

The two actors *p* and *o* differ on a diffuse status characteristic *D* (*p* possesses the highly valued state in this example). Diffuse status characteristics have associated general capacity expectations, *Γ*, which are activated in the situation. This general expectation leads individuals to associate states of the instrumental characteristic *C** (the specific characteristic needed to complete a given task) to individuals consistent with their general expectations. Those who possess the high state of *C** are expected to achieve success at task *T*; those who possess the low state of *C** are expected to fail at the task. For example, if the diffuse status characteristic were gender, *p*'s cognitive process would progress as follows:

1. I am a male, and I am working with a female.
2. Males (like me) are more capable than females (like my partner).
3. As I am more capable than my partner, I expect to possess the special ability needed to succeed at this task. I expect that my partner will not.
4. Therefore, unlike my partner, I expect to be successful at this task.

Because specific status characteristics do not have associated general expectations, the burden of proof completion process works in a slightly different way:

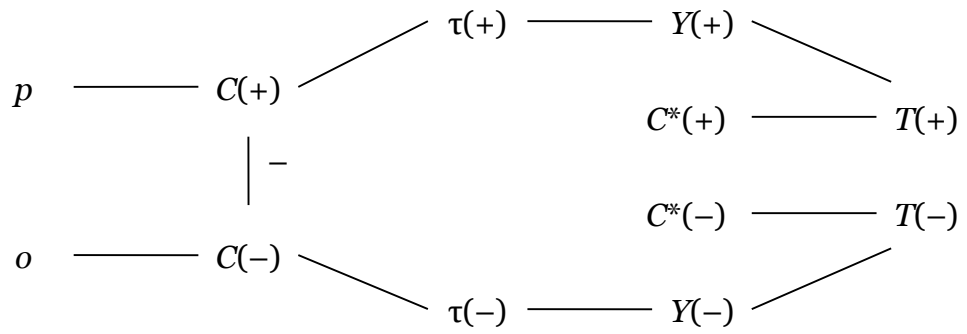


Figure 3. Burden of Proof for Specific Status Characteristics

In this case, the states of the specific status characteristic induce beliefs about task outcomes τ associated with the specific capacities of the individual. These task outcome expectations lead the individual to assign abstract task ability Y to individuals in a consistent manner, which is linked to task success and failure. If the specific characteristic were mathematical training, p's cognitive process would proceed as follows:

1. I am trained in mathematics, while my partner is not.
2. People that are trained in mathematics (like me) are successful at completing mathematical tasks, unlike my partner.
3. Since I would expect better outcomes than my partner on mathematical tasks, I am generally better at tasks than my partner.
4. Therefore, I expect to be successful at this task, while I expect my partner will not.

This process is formally presented below.

ASSUMPTION (Burden of Proof Completion Process)[3]

Given that a salient status element, possessed or connected to an interactant, is not connected to the task, then:

1. If the status element is the state of a diffuse characteristic, the associated generalized expectation state will be activated, and it will become relevant to a similarly evaluated state of *C**.
2. If the status element is the state of a specific characteristic, its relevant task outcome state will be activated. This task outcome state will become relevant to a similarly evaluated state of abstract task ability and the latter will become relevant to a similarly evaluated outcome state of the group task.

The Burden of Proof assumption, while integral to the theory, suffers from a conceptual inconsistency as well as a substantial limitation. First, the assertion that specific and diffuse status characteristics activate entirely distinct cognitive processes is inconsistent with a "cognitive miser" perspective (Fiske and Taylor 1991); a common cognitive process for both diffuse and specific status characteristics would allow individuals to develop preliminary expectations with greater ease than evaluating specific and diffuse status characteristics as distinct

[3] Berger, Fişek, Norman, and Zelditch Jr. (1977).

types of information. In addition, there are aspects of the burden of proof process for specific characteristics that are inconsistent with a cognitive approach. To illustrate, compare the specificity of the induced elements for diffuse and specific status characteristics:

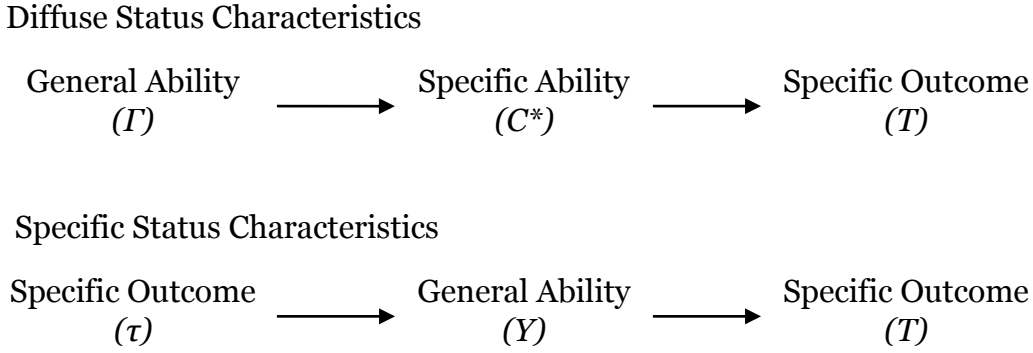


Figure 4. Burden of Proof Process Element Characteristics

The higher-order thinking necessary to make relative evaluations requires generalization from immediate stimuli. The process for diffuse status characteristics involves an initial abstraction from discriminating information, which leads to an evaluation of specific relevant ability and its congruent specific outcome. With specific status characteristics, on the other hand, generalization is preceded by a secondary specific expectation. In addition, as Simpson and Walker (2002) highlight, the general ability induced by specific status characteristics is directly prior to outcome expectations, while the general ability associated with diffuse status characteristics affects outcome expectations through an additional specific expectation. Their solution involves moving the specific ability expectation *(C*)* to a position later in the cognitive model, as depicted in Figure 5 below:

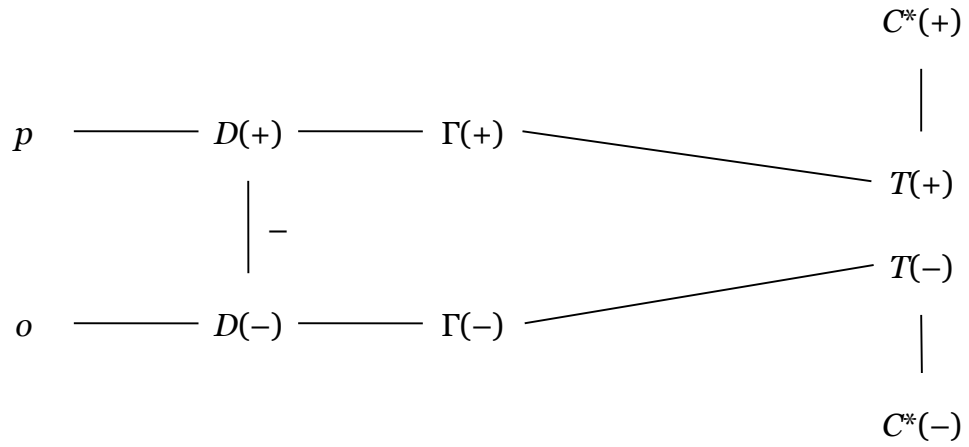


Figure 5. Burden of Proof for Diffuse Status Characteristics (Simpson and Walker 2002)

This modifies the model as follows:

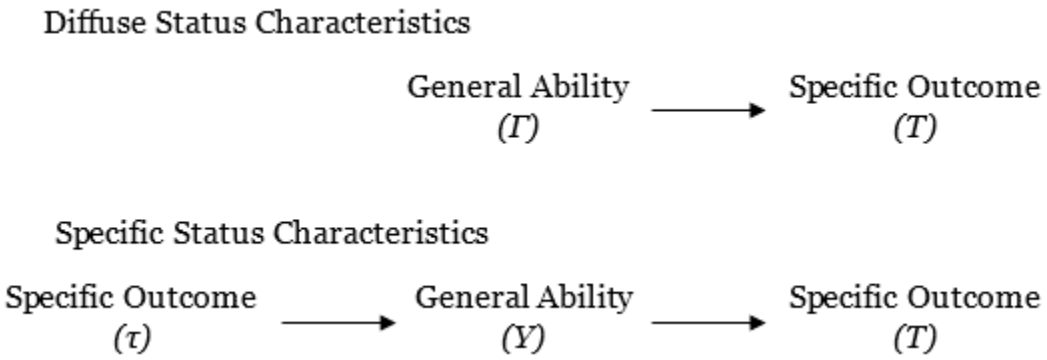


Figure 6. Burden of Proof Process Element Characteristics (Simpson and Walker 2002)

The limitation of the Burden of Proof process is that it treats all status characteristics as having equal path lengths, i.e. as having the same effect on expectations of task success. In fact, Simpson and Walker's (2002) primary critique is that diffuse and specific status characteristics likely activate task outcome expectations of differing strengths. Their modification shortens the

path length for diffuse status characteristics (shown in Figures 5 and 6), resulting in stronger effects on expectations for diffuse status characteristics. However, the strength of all diffuse status characteristics are still conceptualized as equal (as are the strengths of all specific status characteristics).

In their discussion, Simpson and Walker (2002) mention an alternative approach to conceptualizing differences between specific and diffuse characteristics: that the processes these characteristics activate may not be *qualitatively* different (as in the original formulation and Simpson and Walker's reformulation), but *quantitatively* different (as those working in "graded expectations" argue[4]). Simpson and Walker (2002) highlight two current limitations of the graded expectations approach. First, there is not currently an *a priori* way to establish the strength of expectations generated by status characteristics. Second, the graded expectation approach is difficult to incorporate into the graph theoretic formulation, which is the most formally developed presentation of the theory.

In this paper, I will lay the foundation for a quantitative difference approach to status characteristics that attempts to address these limitations. First, while I will not be able to formally derive weights for status characteristics, I will have an independent measure in the experimental design to approximate them. Second, the reformulation proposes a change to the induced elements in the Burden of Proof assumption that eliminates qualitative differences between specific and diffuse status characteristics from the graph construction process, simplifying the

[4] For examples, see Foddy and Smithson (1996) and Shelly (1998)

weighting of status information should a quantitative extension of the theory be developed.

The key to my reformulation is informed by a comment in Berger, Ridgeway, and Zelditch (2002):

> "although particular status characteristics often do have historically particular features, they appear also to have a core content of status typifications in common, variously described in terms of complementary differences in instrumental versus expressive behavior (Gerber 1993, 1996; Smoreda 1995; Wagner and Berger 1993, 1998), competence versus likeability (Fiske 1998; Glick and Fiske 1998), or agency versus communality (Bakan 1966; Conway et al. 1996; Gerber 1988)".

The only attempt to directly measure these typifications (i.e., expectations) within SCT was performed by Zeller and Warnecke (1973), based on an early version of the theory (Berger, Cohen, and Zelditch Jr. 1966). The questions that were initially used to measure general competence were:

(1) Compared to you, how well do you expect the other group member to do in situations in general?

(2) In terms of things that count in this world, how do you compare to the other group member?

(3) How intelligent are you compared with the other group member?

(4) How worthy are you compared with the other group member?

(5) How industrious are you compared with the other group member?

(6) Are you superior or inferior to the other group member?

(7) Are you better or worse than the other group member?

(8) Who is more able to do things, you or the other group member?

(9) Are you more or less moral than the other group member?

Based on pretest results, question 9 was omitted from the experiment because it did not correlate with the other questions. Question 5 was also dropped from the analysis due to low correlation. The remaining seven questions were analyzed using factor analysis, which suggested that questions one through three sufficiently captured expectations of general competence. These questions resulted in a significant improvement in overall model fit compared to using status differences alone. However, Zeller and Warnecke's (1973) work did not explore expressive behavior or the specific elements in the cognitive process proposed by SCT, as it predates the research discussed in Berger et al. (2002) and the version of SCT that incorporates graph theory. Fortunately, research on the Stereotype Content Model (SCM) has systematically explored the relationship between these status typifications[5] under the names *warmth* and *competence*, as well as their role in stereotype attributions. As such, my reformulation of SCT will be driven by an attempt to integrate the work of SCT and SCM.

The Stereotype Content Model

In the SCM work of Cuddy, Fiske, and Glick (2008) we find a claim nearly identical to the Berger et al. (2002) quote noted above:

> "The SCM's first tenet is that perceived warmth and competence underlie and differentiate group stereotypes. Although specific group stereotypes have some idiosyncratic content (e.g., the notion that Black people are "rhythmic"), underlying such beliefs are more

[5] *Status typifications* refer to "abstract conceptions of what high- and low-status behaviors are like and are socially constructed" (Fişek, Berger, and Norman 1991:118).

> general themes organized along warmth and competence dimensions. Although we do not discount the importance of specific, historically conditioned beliefs about groups, we suggest that much of the variance in stereotypes of groups is accounted for by the more basic warmth and competence dimensions."

This is the central tenet of the Stereotype Content Model: that warmth and competence are the primary dimensions along which individuals make social judgments. Abele and Wojciszke (2007) administered a list of 300 personality trait names to 320 participants, using traits from research on agency and communion, masculinity and femininity, intellectual and social orientations, self versus other orientation, morality, warmth and competence, individuality and collectivity, and 60 traits representing the Big Five model of personality. They found a two-factor solution consistent with a warmth/competence conceptualization that accounted for nearly 90% of item variance. SCM research also finds that these dimensions account for 82% of the variance in evaluations of everyday social behaviors (Wojciszke, Dowhyluk, and Jaworsky 1998) and that the overwhelming majority of personally-experienced past events are framed in terms of competence and warmth (Wojciszke 1994). These findings have been replicated in US samples (Fiske, Cuddy, Glick, and Xu 2002; Fiske, Xu, Cuddy, and Glick 1999) as well as in 18 other nations (Fiske, Cuddy, and Glick 2007).

SCM theorists and their predecessors suggest that the fundamental nature of these dimensions can be illustrated using an evolutionary perspective. From this perspective, the primary information organisms ascertain when confronted by another organism is their intent (help or harm, captured by warmth) and their ability to realize that intent (competence) (Cuddy, Fiske, and Glick 2008; Fiske,

Cuddy, and Glick 2007). From this perspective, warmth is the dimension of most importance and occurs temporally prior to competence judgements. A number of studies support this assertion (e.g. Abele and Wojciszke 2007; Wojciszke et al. 1998). However, as Abele and Wojciszke (2007) find, the relative importance of competence increases with self-other outcome dependency (an important point I will revisit later).

Of particular importance to SCT is the work of Yzerbyt and his colleagues (Yzerbyt, Kervyn, and Judd 2008; Judd, James-Hawkins, Yzerbyt, and Kashima 2005; Yzerbyt, Provost, and Corneille 2005) in which the relationship *between* warmth and competence is explored. While some research has shown that individuals ranked high in warmth or competence are also seen as high in the other dimension (e.g. Rosenberg, Nelson, and Vivekananthan 1968), research on two-group evaluations suggests that there is a tendency to perceive one group as warm and incompetent and the other group as competent and cold. Judd et al. (2005) performed a number of experiments to explain this discrepancy. They found that when comparing groups or individuals, participants rated one group as relatively more competent and the other group as relatively more warm, regardless of whether the comparisons involved a group that included the participant or not. However, when asked to rate a single group, a "halo effect" was found, where a target seen as high in one dimension was also rated has high on the other. They concluded that there is something about the comparative context that leads to what they term a "compensation effect". This effect was also seen when examining linguistic competence and warmth among high-status

(French) and low-status (Belgian) French speakers. The term compensation was used because it was theorized that issues of justice lead people to compensate groups or individuals rated as relatively low on one dimension by favoring them on the other dimension. However, the work of Yzerbyt et al. brings the theory behind this effect into question. For his first experiment, Yzerbyt et al. (2008) replicated the findings of Judd et al. (2005): when one dimension was manipulated, participants made attributions on the other dimension that favored the disadvantaged group. They then introduced a third variable, healthiness, and examined the effect on this third variable when warmth or competence was manipulated. The question Yzerbyt hoped to answer was whether compensation occurs on any two dimensions that are available (in line with a compensation or justice concern), or if there is something unique about warmth and competence that accounts for this effect. They found that when warmth or competence was manipulated, the group high in this dimension was also seen as relatively more healthy, i.e. a "halo effect". Therefore, it appears that warmth and competence activate a fundamental role distinction in the comparative context. Similar findings have emerged in the study of occupational status (Conway et al. 1996) as well as gender, from both stereotypical arrangements (Gerber 1996, 1993,1988; Smoreda 1995) and role-reversals (Geis, Brown, Jennings, and Corrado-Taylor 1984). Given that SCT describes the conditions under which expectations arise in groups where individuals make status comparisons, I anticipate that the "compensation" effect will be an important aspect of warmth and competence evaluations in my experiments.

At first glance, compensation appears to be contradicted by the findings of SCT: Bonacich and Lewis (1973) and Lewis (1972) find that the task leader in homogenous groups is often the most liked group member. However, as Burke (1967) and Lewis (1972) highlight, likability and warmth are not synonymous; rankings of likability are only moderately correlated with positive socioemotional behaviors. While prosocial behavior may contribute to positive sentiment, it is possible for warm individuals to be disliked and cold individuals to be liked. In addition, those who are perceived as competent are often admired independent of their perceived warmth. The relationship between warmth, competence, and liking, while theoretically interesting, is beyond the scope of the current study.

Theory

The first step in determining how warmth and competence expectations can be incorporated into SCT is to examine the nature of these expectations. Warmth is presented in SCM as analogous to the concepts of *expressivity* and *communality*; these concepts focus on behavioral expectations (i.e. how a person should *act*). Behavioral expectations are depicted within SCT as *status typification states*, described below. Competence, however, is not strictly equivalent to the concepts of *instrumentality* or *agency*; while competence does imply behavioral expectations similar to these concepts, it also implies expectations of general ability (Cuddy, Fiske, and Glick 2008). This suggests that competence and warmth should be incorporated into SCT in slightly different ways.

The primary modification to SCT proposed here is a revision to the Burden of Proof assumption as follows:

> **ASSUMPTION* (Burden of Proof Completion Process)** Given that a salient status element, possessed or connected to an interactant, is not connected to the task, then:
>
> 1. The associated status typification of warmth will be activated. This status typification state will become relevant to an oppositely evaluated state of abstract task ability. The state of abstract task ability will become relevant to a similarly evaluated outcome state of the group task.
> 2. The associated general competence expectation will be activated, and it will become relevant to a similarly evaluated outcome state of the group task.

Status typifications have been used previously within expectation states research. In an integration of SCT and theory on behavior within groups, Fişek, Berger, and Norman (1991) propose that status typification states activate expectations of abstract task ability. The graphical depiction of the process described above is given in Figure 7 below.

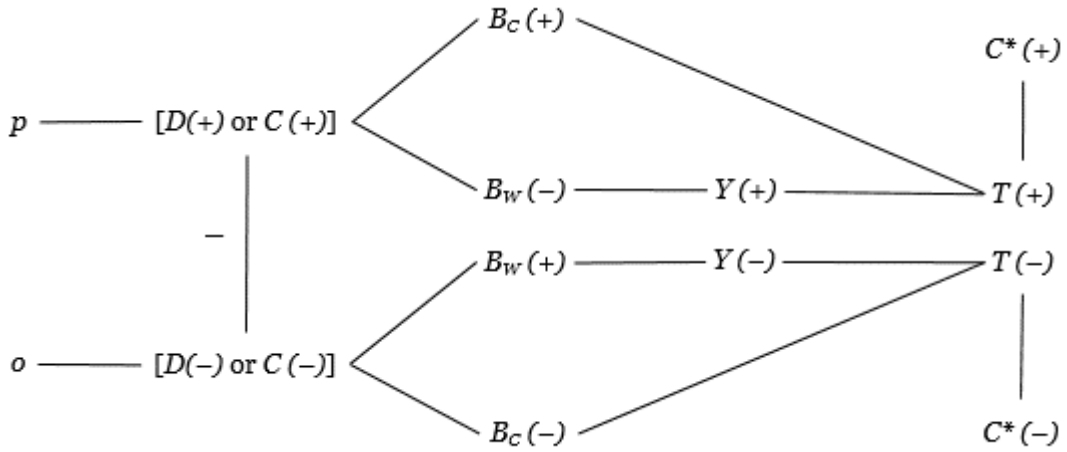


Figure 7. Proposed Burden of Proof Process

In the above graph, *B* represents elements of competence and warmth. In addition to incorporating SCM ideas, this conception involves a logically consistent progression of general capacities to specific capacities. However, it increases the number of paths associated with a single status difference. For example, when calculating the expectations for self, instead of one path of length 4 and one of length 5 (e.g., as in Figures 2 and 3), there is one path of length 3 (consistent with the Simpson and Walker formulation), two paths of length 4,and one of length 5. This does not affect the process for calculating expectation advantage or the usefulness of the graph theory, but does make direct comparisons to earlier research more difficult.

Finally, there is the question of how to conceptualize the differences between characteristics and operationalize their relative strengths. The definitions given in SCT distinguish between diffuse and specific status characteristics by their connections to specific and general capacities. For example, spatial reasoning

skill (a specific status characteristic) is connected to at least one other specific ability (e.g. agility), which may itself be a specific status characteristic. Gender, on the other hand, is connected to both specific capacities (such as spatial reasoning skill) but also general ones (such as intelligence, itself a diffuse status characteristic). In other words, the distinction is one of eigenvector centrality in the universe of capacities: diffuse status characteristics tend to be associated with a greater number of capacities (i.e., have more ties), including ties to other high centrality (general) capacities. Why should more central characteristics have stronger effects on expectations? It is not due to wider applicability, for the burden of proof process suggests that any discriminating status characteristic will be activated in a task-focused collectively-oriented group unless explicitly dissociated from the task. Instead, I argue that it is because each of the capacities tied to a status characteristic has its own associated expectations. In effect, central ("diffuse") characteristics are augmented by association. These characteristics are more highly embedded within the cultural network of characteristics. This is illustrated graphically below using education and mathematical ability.

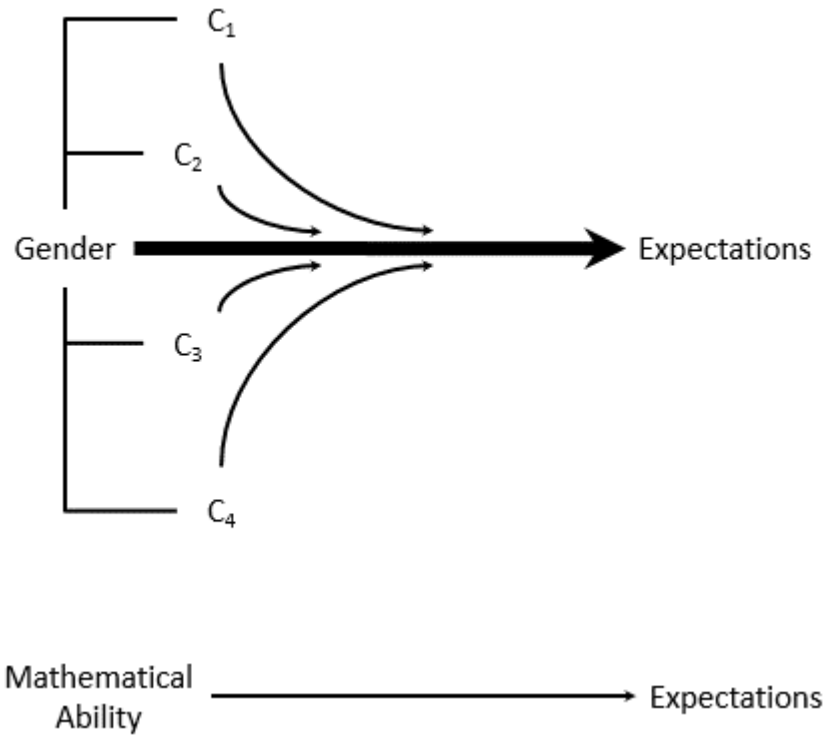


Figure 8. A Conception of Status Characteristic Strength

If warmth and competence are the common currency of both diffuse and specific status characteristics, we can use the magnitude of these expectations as a proxy for network embeddedness. In other words, warmth and competence expectations can form a basis for weighting the effects of different status characteristics on relative evaluations and behavior in task groups. Initially, this can be accomplished *a posteriori* via post-experiment questionnaires; with a

sufficient number of experiments, meta-analysis could be utilized to produce *a priori* weights.[6]

Experiment One: Diffuse Status Characteristics

The first experiment examined warmth and competence expectations that emerge due to diffuse status characteristics. Specifically, I test whether expectations of warmth and competence act as intervening variables between status and power and prestige behavior. This was accomplished by utilizing a standardized research design developed for use with Status Characteristics Theory.

Theory and Hypotheses

In accord with Yzerbet et al. (2008), I expect to find a compensation effect between competence and warmth: those with high status will rate themselves as higher in competence and lower in warmth than their low status partners. Conversely, those with low status will rate themselves as lower in competence and higher in warmth than their high status partners.

Hypothesis 1a: High status individuals will rate themselves higher in competence than they rate their low status partners (Condition 1).

[6] See the Discussion section of Experiment 1 for an illustration of how meta-analysis has been used in SCT to develop *a priori* point predictions of status effects.

Hypothesis 1b: High status individuals will rate themselves lower in warmth than they rate their low status partners (Condition 1).

Hypothesis 2a: Low status individuals will rate themselves lower in competence than they rate their high status partners (Condition 2).

Hypothesis 2b: Low status individuals will rate themselves higher in warmth than they rate their high status partners (Condition 2).

In addition to within-condition comparisons, the distinction between high and low status individuals should hold across conditions as well:

Hypothesis 3a: High status individuals (Condtion 1) will rate themselves higher in competence than low status individuals (Condition 2) will rate themselves in competence.

Hypothesis 3b: High status individuals (Condition 1) will rate themselves lower in warmth than low status individuals(Condition 2) will rate themselves.

Hypothesis 4a: High-status Individuals will rate their low status partners lower in competence (Condtion 1) than low-status individuals will rate their high status partners (Condition 2) in competence.

Hypothesis 4b: High-status Individuals will rate their low status partners higher in warmth (Condtion 1) than low-status individuals will rate their high status partners (Condition 2) in warmth.

As an alternative to the burden of proof process described by SCT, I propose that competence and warmth judgments are the intermediary between observed status differences and differential behavior. This is the main contribution of the Stereotype Content Model to SCT.

Hypothesis 5a: Competence judgments mediate the relationship between status and resistance to influence.

Hypothesis 5b: Warmth judgments mediate the relationship between status and resistance to influence.

Finally, I will look at the relative effect sizes of competence and warmth. Much of the SCM research suggests that warmth is the primary dimension of social judgments. However, as Abele and Wojciszke (2007) point out, self-other outcome dependency increases the importance of competence evaluations. Since participants believe their payment depends on group performance, I expect competence will be the more important explanatory variable in this setting.

Hypothesis 6: In a task-focused setting, competence will have a stronger effect on resistance to influence than warmth.

Methods

A standard experimental setting has been developed for testing SCT (Cook, Cronkite, and Wagner 1974). For these experiments, the computer-based version of the protocol developed by Troyer (2001) was translated to the DatStat Illume platform (see Appendix B for a detailed description of the protocol). Subjects

were either directed to navigate to a website from their personal computer, or brought into a laboratory with computer terminals.

Eighty-three undergraduate students from the University of Arizona participated in the experiment. Fifty of these students were directed to a website, where they could complete the experiment at the time and location of their choosing. The remaining 33 were brought into a laboratory to complete the experiment. Nine participants (11% of the sample) were excluded from the analysis due to an inability to identify the status manipulation. This is slightly lower than the mean exclusion rate of 14.53% identified by Dippong (2012) for SCT research. In addition, using time stamps incorporated into DatStat Illume, the mean and standard deviation of time spent on various sections of the experiment were calculated for the individuals brought into the laboratory. Online participants who spent less or more than two standard deviations from the mean time on a section of the experiment were also excluded from the analysis. Those who spent less time were unable to completely review the instructions and description of the experiment, including the emphasis on being task focused and collectively oriented (scope conditions of the theory). Those who spent more time generally completed the experiment over the course of multiple days. These participants were likely aware of the deception, i.e. that they were not interacting in real-time with a human partner. Overall, an additional 17 participants were excluded for time reasons. Therefore, the final sample size for this experiment is 57 individuals (27 online and 30 in the laboratory).

At the onset of the experiment, after reviewing and signing a consent form, individuals were asked a number of questions relating to the status manipulation (education). They were then told that they would be engaging in a group task with a partner over the computer, and that this individual was either a community college student or graduate student. This produced two conditions; one where the participant had a relative status advantage (Condition 1), and one where the participant had a relative status disadvantage (Condition 2). Each participant was randomly assigned to a condition; 28 individuals were assigned to Condition 1, while 29 individuals were assigned to Condition 2. The task used in this study was described as measuring a (fictitious) ability called "contrast sensitivity". Participants were informed that their compensation would be based on their group performance on the task and that taking into account the opinions of their partner generally results in better overall performance; these claims are presumed to induce collective orientation and task focus (scope conditions of the theory). Over the course of 25 trials, individuals were given decision-making tasks related to contrast sensitivity. These tasks are designed such that there is no clear answer. After each decision, the individual was informed of their partner's decision. They then had an opportunity to change their decision. The experimenter-controlled "partner" is made to disagree with the participant on most of the trials (20 of 25). The proportion of disagreement trials in which the partner stays with their initial choice is considered a measure of resistance to influence, an example of power and prestige behavior. This is denoted *P(S)*, or proportion of stay responses, within the SCT literature. At the end of the contrast sensitivity trials, a survey was administered to participants asking them to rate

themselves and their partners on measures of warmth and competence. After completing this survey, subjects were debriefed and paid.

Measures

Power and prestige behavior was measured using resistance to influence, as described above. Competence and warmth of participants and their partner were measured using a post-experimental questionnaire, where individuals were asked to rate themselves and their partners on a seven-point scale for a number of attributes. The competence items were skillful, intelligent, confident, efficient, foresighted, and competent. Warmth was measured with the following items: trustworthy, tolerant, friendly, sincere, helpful, and warm. These items are the ones utilized most frequently in SCM research to measure warmth and competence.

Analysis

Table 1 below provides the mean rating on each measure of warmth and competence by condition and target (self or partner). Scores for each item range from -3 ("not at all like me/my partner") to +3 ("very much like me/my partner").

	Condition 1 (High Status)		Condition 2 (Low Status)	
	Self	Other	Self	Other
Competent	1.82	1.07	2.34	1.03
Confident	1.25	0.82	1.07	1.38
Efficient	1.79	0.93	1.62	0.97
Foresighted	0.96	0.46	1.14	0.79
Intelligent	1.86	0.86	1.66	1.07
Skillful	1.50	0.68	1.59	1.10
Warm	1.43	0.43	1.90	0.48
Friendly	2.18	0.36	2.41	0.76
Helpful	1.75	0.68	2.24	0.69
Sincere	1.89	0.46	2.14	0.48
Tolerant	1.21	0.50	1.93	1.14
Trustworthy	2.32	0.36	2.69	0.41

Table 1. Mean Ratings of Warmth and Competence by Condition, Experiment 1

The results shown above highlight an important unexpected finding: with the exception of "confident" in the low-status condition, on every measure of warmth and competence individuals rated themselves more highly than they rated their partners. I expect that this trend is due to a self-serving bias as well as the limited information participants have about their partner: given that the only information provided about participants' partners is their level of education, subjects may have been reluctant to make strong assertions about them.

To evaluate Hypotheses 1 through 4, indices were created by summing the six warmth items and the six competence items. The resulting values range from –18 to +18. In addition, the differences between self and other evaluations were calculated to produce measures of relative warmth and competence (each varying between –36 and +36), with higher values indicating greater warmth and

competence for the participant relative to their partner. Results are presented in Table 2, below.

	Condition 1: Relative Status Advantage	Condition 2: Relative Status Disadvantage
Competence, Self	9.179	9.414
Competence, Other	4.821	6.345
Warmth, Self *	10.786	13.310
Warmth, Other	2.786	3.966
Relative Competence	4.357	3.069
Relative Warmth	8.000	9.345
N	28	29

†p<0.1 *p<0.05 **p<0.01 ***p<0.001

Table 2. Indices of Competence and Warmth by Condition, Experiment 1

Measures of relative warmth and competence support the existence of a compensation effect: compared to the status disadvantage condition, individuals in the status advantage condition rated themselves as higher in competence (4.357 vs. 3.069) and lower in warmth (8.000 vs. 9.345). However, the expected differences in relative warmth and competence appear to be the product of perceptions of self-warmth and other-competence. Only the difference between self-evaluations of warmth reaches statistical significance, supporting Hypothesis 3b (Hypotheses 3a and 4 are not supported). The differences described in Hypotheses 1a and 2b are also statistically significant, but these findings should be interpreted with caution given the trends evident in Table 1 (as should the lack of support for Hypotheses 1b and 2a).

In order to test Hypotheses 5, a series of linear regressions were completed. For status, an expectation advantage was calculated using path lengths suggested by

Balkwell (1991) and the proposed graph, reproduced in Figure 9 below (see Appendix A for a discussion of expectation advantage calculation). Results are presented in Table 3.

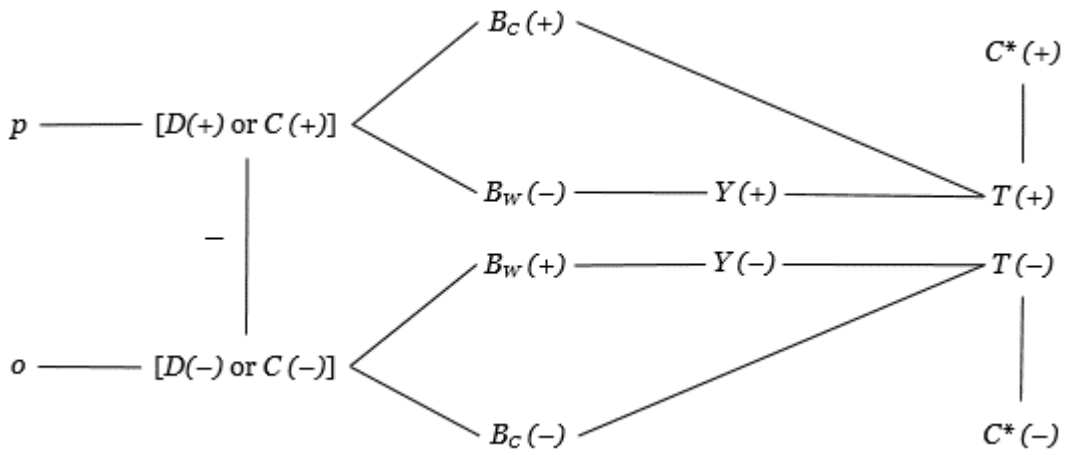


Figure 9. Proposed Burden of Proof Process (reproduced from Figure 7)

	I	II	III
Constant	0.594 ***	0.632 ***	0.629 ***
	(0.022)	(0.032)	(0.032)
Status	0.026	---	0.015
	(0.019)		(0.018)
Relative Competence	---	0.011 **	0.010 *
		(0.004)	(0.004)
Relative Warmth	---	-0.009 *	-0.008 *
		(0.004)	(0.004)
N	57	57	57
R^2	0.033	0.135	0.146

†p<0.1 *p<0.05 **p<0.01 ***p<0.001

Table 3. Regression on *P(S)*, Experiment 1 (Unstandardized Coefficients)

In Model 1, only status is used as a predictor. This model represents a typical SCT analysis. The equation for resistance to influence is described by the theory

as $P(s) = m + q(e_p - e_o)$, where $(e_p - e_o)$ is the actor's *expectation advantage*, calculated from the graph of the situation (as described in Appendix A). The m and q within the equation represent empirically derived constants; m is conceptualized as the baseline resistance to influence, while q is affected by experimental design (e.g. manipulation strength and environmental effects) and determines the magnitude of the status effect on resistance to influence. In this model, status did not have a significant effect on resistance to influence (p=0.173).

In Model 2, only relative competence and warmth expectations are used as predictors. Both of these measures are statistically significant and in the predicted direction. Model 3 includes status, competence expectations, and warmth expectations. As in Model 2, both competence and warmth expectations are significant and in the predicted direction. Consistent with Model 1, there is no significant effect of status on resistance to influence (p=0.404). While warmth and competence expectations affect resistance to influence in a way consistent with the proposed theory, the lack of status effects precludes an evaluation of Hypotheses 5.

In order to test the final hypothesis, the previous regression analyses are presented below with standardized coefficients.

	I	II	III
Status	0.183	---	0.109
Relative Competence	---	0.466	0.437
Relative Warmth	---	-0.428	-0.399
Competence–Warmth	---	---	---

Table 4. Regression on *P(S)*, Experiment 1 (Standardized Coefficients)

As can be seen in Models 2 and 3, the standardized coefficients for warmth and competence are similar, with competence having a slightly larger coefficient. In contrast to the majority of SCM research, warmth does not appear to be the primary dimension of social judgments in task-oriented groups, consistent with Hypothesis 6.

Discussion

Overall, the regression results suggest that expectations of warmth and competence affect resistance to influence in a way that is consistent with the proposed theory: those with relatively high competence are less likely to be influenced by their partner, while those with relatively high warmth are more likely to be influenced by their partner (Table 3). In addition, there is a significant difference between self-perceptions of warmth in the high status and low status conditions (Table 2). One unexpected finding in the warmth and competence data is that these differences in expectations are based primarily on self-perceptions of warmth and other-perceptions of competence. This finding may be the result of a weak status manipulation (discussed below). It is also possible that, for a relatively low status individual, attributing greater competence to other and greater warmth to self minimizes threats to the

individual's self-conception. Competence and warmth evaluations in subsequent experiments will be analyzed for evidence of this attributional trend.

The main problem with the experiment results is the lack of status effects on resistance to influence. The effect size (Cohen's *d*) in the observed data is equal to 0.366, which is substantially lower than the effect size observed in published SCT research. There are a number of potential explanations for this discrepancy. First, the demographic questions asked early in the experimental protocol included a question about the participant's gender. This question may have primed participants to consider the gender of their partner. To the extent that gender attributions were made by participants, this would produce a source of uncontrolled variation in the dependent variable. Another potential explanation for these results involves the use of online participants for a portion of the data. A meta-analysis of the standard protocol by Kalkhoff and Thye (2006) finds that a computer-mediated experiment (the "Computer" version) produces lower *q* values than protocols that utilize a console to communicate contrast sensitivity decisions (the "Basic" version) or protocols that manipulate status through a video introduction (the "Video" version). Specifically, the Basic protocol produces a mean *q* value of 0.0977, the Video protocol produces a mean *q* value of 0.1372, and the Computer protocol produces a mean *q* value of 0.0542. It is possible that an "Online" version may result in an even lower *q* value than the Computer version. Separate analysis of the online data and laboratory ("Computer") data is presented in Table 5. The limited data do not seem to

support the idea that online administration of the experiment results in lower *q* values than those produced by a laboratory setting.

	Computer	Online
Constant	0.580 ***	0.610 ***
	(0.033)	(0.031)
Status	0.020	0.031
	(0.027)	(0.026)
N	30	27
R^2	0.019	0.054

Table 5. Regression on *P(S)* by Protocol Differences, Experiment 1

In addition to exploring variations in protocol, Kalkhoff and Thye (2006) present a method for estimating *m* and *q* for the purposes of *a priori P(S)* point predictions. In order to compare the observed and predicted *m*, *q*, and *P(S)* values, the expectation advantage for Experiment 1 was recalculated using the original formulation of the theory. These results are given in Table 6. As can be seen in the table, the observed *m* and *P(S)* values are approximately two standard

	Predicted	Observed
m	0.533	0.594
		(0.022)
q	0.063	0.079
		(0.058)
P(s), Condition 1	0.557	0.625
		(0.031)
P(s), Condition 2	0.509	0.564
		(0.032)

Table 6. Predicted and Observed Values, Experiment 1

errors higher than the predicted values. The *q* value is also slightly higher than the predicted value, but has a very large standard error relative to the magnitude of the constant. It should also be noted that the difference in predicted resistance to influence is equal to a different decision on one contrast sensitivity trial (out of twenty). Given the small predicted difference and large standard error of the *q* constant, the non-significant status effect may be the product of a low sample size. For the four studies using the Computer version of the SES identified by Kalkhoff and Thye (2006)[7], the mean number of participants per condition is approximately 24, which is similar to the sample sizes used in this study. However, due to the small effect size observed in this experiment, a power analysis finds that a sample of 94 participants per condition is necessary to achieve a power of 0.80, suggesting that the current study is underpowered relative to published studies. The final possible explanation for the non-significant status effect is that the status manipulation was not sufficiently strong to produce significant effects. This could be due to the size of the difference in education within conditions, or because education has insufficient status value to produce large effects on influence. Subsequent research into the usefulness of warmth and competence expectations as intervening variables in the status process may benefit from utilizing a different status characteristic, such as class or occupational prestige.

[7] Foschi (1996); Lovaglia and Houser (1996); Foschi, Enns, and Lapointe (2001); and Foschi and Lapointe (2002).

Experiment Two: Specific Status Characteristics

In order to demonstrate that both diffuse and specific status characteristics can be described using the same process, Experiment 2 evaluates whether specific status characteristics also activate warmth and competence expectations. As with Experiment 1, I also test whether these expectations act as intervening variables between status and power and prestige behavior.

Theory and Hypotheses

The second experiment will replicate the first, but will utilize a specific status characteristic called meaning insight. The hypotheses are identical to those in Experiment 1.

Hypothesis 1a: High status individuals will rate themselves higher in competence than they rate their low status partners (Condition 1).

Hypothesis 1b: High status individuals will rate themselves lower in warmth than they rate their low status partners (Condition 1).

Hypothesis 2a: Low status individuals will rate themselves lower in competence than they rate their high status partners (Condition 2).

Hypothesis 2b: Low status individuals will rate themselves higher in warmth than they rate their high status partners (Condition 2).

Hypothesis 3a: High status individuals (Condtion 1) will rate themselves higher in competence than low status individuals (Condition 2) rate themselves in competence.

Hypothesis 3b: High status individuals (Condition 1) will rate themselves lower in warmth than low status individuals (Condition 2) rate themselves in warmth.

Hypothesis 4a: Individuals will rate their low status partners lower in competence (Condtion 1) than individuals will rate their high status partners (Condition 2) in competence.

Hypothesis 4b: Individuals will rate their low status partners higher in warmth (Condtion 1) than individuals will rate their high status partners (Condition 2) in warmth.

Hypothesis 5a: Competence judgments mediate the relationship between status and resistance to influence.

Hypothesis 5b: Warmth judgments mediate the relationship between status and resistance to influence.

Hypothesis 6: In a task-focused setting, competence will have a stronger effect on resistance to influence than warmth.

The purpose of this experiment is to demonstrate that the same cognitive process can be used to describe the effects of both diffuse and specific status characteristics.

Methods

76 undergraduate students from the University of Arizona participated in the experiment. 54 of these students were directed to a website, where they could complete the experiment at the time and location of their choosing. The remaining 22 were brought into a laboratory to complete the experiment. Fourteen participants (18% of the sample) were excluded from the analysis due to an inability to identify the status manipulation. Following the same procedure discussed in Experiment 1, an additional 17 participants were excluded for time reasons. Therefore, the final sample size for this experiment is 45 individuals (28 online and 17 in the laboratory).

Experiment two used a similar protocol to the first experiment, but the manipulation utilized a specific status characteristic instead of a diffuse one. In this experiment, before engaging in the contrast sensitivity task, participants were given a "Meaning Insight" test. Participants were told that some individuals have a greater ability to discern the meanings of words in an unknown language. They were then asked a number of questions, where they were to determine which of two possible meanings a foreign word had (see Appendix B for a sample meaning insight question). The foreign words were fictitious, as is "meaning insight". At the end of the test, participants were told they scored substantially better or worse than their partners, thereby creating positions of relative status advantage (Condition 1) and disadvantage (Condition 2). Each participant was randomly assigned to a condition; 23 individuals were assigned to Condition 1, while 22 individuals were assigned to Condition 2. After the manipulation,

participants engaged in the contrast sensitivity task, and the experiment proceeded as Experiment 1.

Measures and Analysis

The measures used are identical to Experiment 1.The analysis proceeds as in Experiment 1. Mean ratings of warmth and competence are shown below in Table 7.

	Condition 3 (High Status)		Condition 4 (Low Status)	
	Self	Other	Self	Other
Competent	2.17	0.87	1.59	1.77
Confident	1.04	0.83	1.00	1.27
Efficient	1.96	0.87	1.50	1.41
Foresighted	1.26	0.61	0.82	0.64
Intelligent	2.09	0.91	1.23	1.45
Skillful	1.74	0.83	0.96	1.64
Warm	1.17	0.39	1.14	0.50
Friendly	1.35	0.78	2.05	0.64
Helpful	2.04	0.74	1.82	1.05
Sincere	1.91	1.09	2.14	0.82
Tolerant	1.00	1.00	1.36	1.00
Trustworthy	2.35	0.83	2.36	0.64

Table 7. Mean Ratings of Warmth and Competence, Experiment 2

As with Experiment 1, individuals generally rated themselves as higher on measures of warmth than their partner across conditions. However, those in the low status condition rated themselves as *less* competent than their partner on five of six items. The indices for warmth and competence are presented in Table 8.

	Condition 1: Relative Status Advantage	Condition 2: Relative Status Disadvantage
Competence, Self *	10.261	7.091
Competence, Other *	4.913	8.182
Warmth, Self	9.826	10.864
Warmth, Other	4.826	4.636
Relative Competence ***	5.348	−1.091
Relative Warmth	5.000	6.227
N	23	22

†p<0.1 *p<0.05 **p<0.01 ***p<0.001

Table 8. Indices of Competence and Warmth by Condition, Experiment 2

As with Experiment 1, the measures of relative competence and warmth are consistent with the compensation hypothesis of the SCM. In Experiment 1, neither of these measures reached statistical significance; in this experiment, relative competence was significantly different between conditions in the expected direction. The indices also provide some support for Hypotheses 3 and 4: those in the high status condition rate themselves higher in competence and lower in warmth than those in the low status condition, and rate their partners lower in competence and higher in warmth. However, only the difference in competence ratings between conditions are statistically significant (Hypotheses 3a and 4a; Hypotheses 3b and 4b are not supported). The differences described in Hypotheses 1a and 2b are also statistically significant; however, given the bias found in Experiment 1, these results should be interpreted with caution.

The regression analysis on resistance to influence is presented in Table 9.

	I	II	III
Constant	0.608 ***	0.606 ***	0.605 ***
	(0.021)	(0.035)	(0.035)
Status	0.028	---	0.010
	(0.018)		(0.021)
Relative Competence	---	0.007 *	0.006 †
		(0.003)	(0.004)
Relative Warmth	---	-0.002	-0.002
		(0.005)	(0.005)
Competence–Warmth	---	---	---
N	45	45	45
R^2	0.053	0.111	0.117

Table 9. Regression on *P(S)*, Experiment 2 (Unstandardized Coefficients)

The results from this regression are substantively similar to Experiment 1. In the first model, status is not a significant predictor of resistance to influence (p=0.129). In the third model, status is still non-significant (p=0.618). The effect of competence expectations is slightly smaller, but still reaches statistical significance. However, the effect of warmth is small and non-significant. As with Experiment 1, given the non-significant effect of status, Hypotheses 5 cannot be evaluated. Standardized coefficients are presented in Table 10. Again, the standardized regression coefficient for competence is larger than that for warmth expectations, supporting Hypothesis 6.

	I	II	III
Status (q)	0.230	---	0.085
Relative Competence	---	0.332	0.290
Relative Warmth	---	-0.066	-0.050
Competence–Warmth	---	---	---

Table 10. Regression on *P(S)*, Experiment 2 (Standardized Coefficients)

In addition to the separate analysis of Experiments 1 and 2, the average proportion of stay responses and expectations across experiments can be compared, as illustrated in Table 11.

Condition	D+	C+	C-	D-
P(S)	0.625	0.641	0.575	0.564
Relative Competence	4.357	5.348	-1.091	3.069
Relative Warmth	8.000	5.000	6.227	9.345
N	28	23	22	29

Table 11. Mean *P(S)* and Expectations for Experiments 1 and 2

Based on the discussion of status characteristic strengths presented earlier (e.g. Figure 8) and Simpson and Walker (2002), the expected ordering of effects is Condition 1 (D+) > Condition 3 (C+) > Condition 4 (C-) > Condition 2 (D-), i.e. diffuse status characteristics are expected to have a stronger effect on expectations than specific status characteristics. The significance of differences in *P(S)*, relative competence, and relative warmth were determined using MANOVA and *post hoc* analysis using Tukey's Honestly Significant Difference (HSD). The results indicate that there are significant differences in relative competence between Experiment 1 Condition 1 (D+) and Experiment 2 Condition 2 (C-) ($p=0.029$), as well as Experiment 2 Condition 1 (C+) and Experiment 2 Condition 2 (C-) ($p=0.010$). There is also a marginally significant difference in relative warmth between Experiment 1 Condition 2 (D-) and Experiment 2 Condition 1 (C+) ($p=0.097$). Given that these differences do not address the differences between like states of diffuse and specific status characteristics (i.e. D+ vs. C+ and C- vs. D-), the MANOVA results cannot address the relative

strength between these characteristics. However, the regression coefficient sizes for warmth and competence in Experiments 1 and 2 are consistent with the proposed differences between specific and diffuse status characteristics.

Finally, since Experiments 1 and 2 both utilize status characteristics as the primary independent variable and produce identical expectation advantages (based on both the 1977 graph formulation and the proposed modification), the data from these two experiments were pooled into a single data set. Experiments 1 and 2 were also run concurrently, i.e. the 102 participants in these experiments were randomly assigned to an experiment and then to a condition. The results of a regression on this pooled data are presented in Table 12.

	I	II	III
Constant	0.600 ***	0.624 ***	0.622 ***
	(0.015)	(0.022)	(0.022)
Status	0.027 *	---	0.012
	(0.013)		(0.013)
Relative Competence	---	0.008 ***	0.007 **
		(0.002)	(0.003)
Relative Warmth	---	-0.007 **	-0.006 *
		(0.003)	(0.003)
N	102	102	102
R^2	0.041	0.115	0.122

†p<0.1 *p<0.05 **p<0.01 ***p<0.001

Table 12. Regression on *P(S)*, Pooled Data (Unstandardized Coefficients)

The analysis of pooled data from Experiments 1 and 2 produces significant status effects, as shown in Model 1. This effect disappears with the inclusion of relative competence and warmth expectations (Model 3). These results provide some support for Hypotheses 5 from Experiments 1 and 2, i.e. that warmth and

competence expectations mediate the effect of status on power and prestige behavior.

Discussion

Overall, the regression results suggest that expectations of competence affect resistance to influence in a way that is consistent with the proposed theory, i.e. those with relatively high competence are less likely to be influenced by their partner (Table 9). However, warmth expectations (while in the expected direction) did not significantly affect resistance to influence.

Unlike Experiment 1, the descriptive statistics of warmth and competence expectations in Experiment 2 were not based primarily on self-perceptions of warmth and other-perceptions of competence. This finding may indicate a weak manipulation in Experiment 1. Alternatively, it may be that meaning insight (as a fictitious ability) is not an integral part of participants' self-identities, such that incompetence at the specific status characteristic is not as threatening to self-conceptions as relative low status related to education. Including measures of identity salience in future research may help clarify the results of these experiments.

This experiment also suffers from a lack of status effects on resistance to influence. As with Experiment 1, undesired gender attributions may have contributed to the small effect size found in this experiment (Cohen's $d = 0.45$). A separate analysis of the online data and laboratory ("Computer") data is presented in Table 12. Consistent with the analysis of Experiment 1, the data do

not seem to support the idea that online administration of the experiment results in lower *q* values than those produced by a laboratory setting; in fact, the laboratory data produced substantially lower *q* and R^2 values compared to the data obtained online. The predictions based on Kalkhoff and Thye (2006) and the expectation advantage based on the original formulation are given in Table 13. As can be seen in the table, *m* and the *P(S)* for each condition deviate from the predicted value by a greater margin than in Experiment 1. In addition (as with Experiment 1), the standard error for *q* is large relative to the observed value. The lack of status effects on influence in Experiment 2 brings into

	Computer	Online
Constant	0.580 ***	0.620 ***
	(0.042)	(0.024)
Status	0.005	0.038
	(0.036)	(0.020)
N	17	28
R^2	0.001	0.119

Table 12. Regression on *P(S)* by Protocol Differences, Experiment 2

	Predicted	Observed
m	0.533	0.608
		(0.021)
q	0.063	0.086
		(0.056)
P(s), Condition 1	0.557	0.641
		(0.029)
P(s), Condition 2	0.509	0.575
		(0.032)

Table 13. Predicted and Observed Values, Experiment 2

question the possibility that the strength of the education manipulation in Experiment 1 was responsible for non-significant effects. Given that the protocol used was identical to those in other SCT studies and the SES involves a negligible amount of subject-experimenter interaction, it is unlikely that protocol or experimenter differences account for the lack of status effects. It is possible that the population used in the experiment had a systematic effect on the research; for the laboratory-run subjects in particular, there was a large percentage of sociology undergraduates. These students may be less susceptible to status manipulations, or may not use status information in the formation of expectations to the extent that other individuals do. The results from the pooled data of Experiments 1 and 2 support the assertion in the discussion of Experiment 1 that larger samples may be necessary to uncover status effects in the population used.

Experiment Three: Manipulating Warmth

In Experiment 1, warmth and competence expectations produced statistically significant effects on resistance to influence. In this study, I will explore the implications of an SCM/SCT integration by incorporating a direct manipulation of warmth, similar to the approach taken by Judd et al. (2005) and Yzerbet et al. (2008). Specifically, warmth will be manipulated in a way that contradicts the warmth expectations associated with the status information given to participants.

Theory and Hypotheses

The first condition will replicate Condition 1 from Experiment 1, in that the participant will be high status relative to their partner. However, participants will be told that their partner is also low in warmth. Low warmth is generally associated with high status, so the additional warmth manipulation contradicts the expectations for the low status partner. Given that low warmth is a high status typification, the warmth manipulation should increase the status expectations for the low status partner. Given an increase in their partner's status, participants should be more willing to defer to their partner's opinion.

Hypothesis 9: Partner possession of low warmth should diminish the effects of low status on an actor's resistance to influence, i.e. P(S) will be lower in Experiment 3 Condition 1 than in Experiment 1 Condition 1.

The second condition will replicate Condition 2 from Experiment 1, in that the participant will be low status relative to their partner. However, participants will be told that their partner is also high in warmth. High warmth is generally associated with low status, so this manipulation should decrease the expectations for the high status partner. Given a decrease in their partner's status, participants should be less willing to defer to their partner's opinion.

Hypothesis 10: Partner possession of high warmth should diminish the effects of high status on an actor's resistance to influence, i.e. P(S) will be higher in Experiment 3 Condition 2 than in Experiment 1 Condition 2.

In effect, these two conditions provide warmth information about the participant's partner that contradicts the expectations associated with their status. As a result, these warmth manipulations should increase the power and prestige of the low status partner, and decrease the power and prestige of the high status partner.

Methods

45 undergraduate students from the University of Arizona participated in the experiment. All participants were brought into a laboratory to complete the experiment. 9 participants (20% of the sample) were excluded from the analysis due to an inability to identify the status manipulation. Therefore, the final sample size for this experiment is 36 individuals.

For Experiment 3, participants completed self-assessments of competence and warmth at the beginning of the experiment (instead of after the contrast sensitivity trials). They were then informed that their partner is a graduate student high in warmth (Condition 1) or a community college student low in warmth (Condition 2). Otherwise, the protocol is identical to Experiment 1 (see Appendix B for details).

Measures

The measures are identical to Experiment 1. However, since warmth and competence self-assessments were administered at the beginning of the experiment, they were not included in the post-experimental questionnaire.

Analysis

In order to determine whether the manipulations produced effects on resistance to influence, a regression was conducted. However, since Experiment 3 is not a full factorial design, it is not possible to distinguish between the effects of status and warmth manipulations. Therefore, graphs for each condition were constructed, and the calculated expectation advantage produced by both manipulations was used as the independent variable. For Condition 1, the graph is shown in Figure 10. Actor *p* (the participant) possesses the high state of education. Actor *o* possesses the low state of education as well as low warmth, which is connected to the positive state of abstract task ability. The graph for Condition 2 is shown in Figure 11. In this case, actor *o* has the low state of education relative to their partner, as well as high warmth.

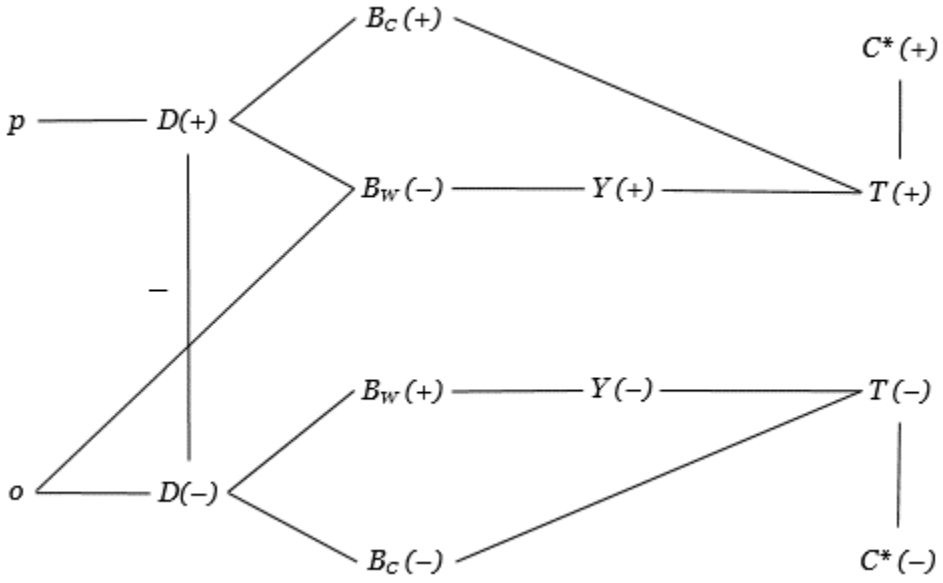


Figure 10. Graph for Condition 1, Experiment 3

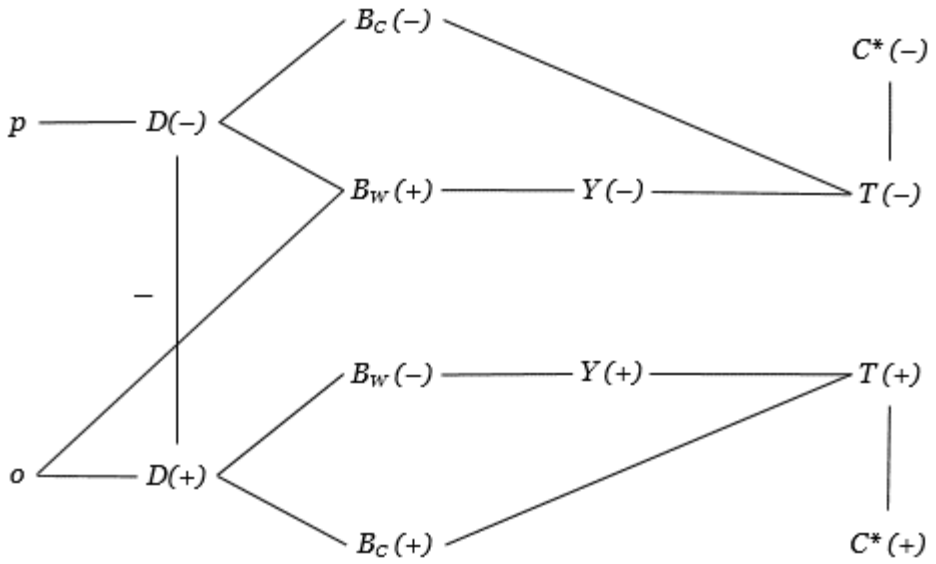


Figure 11. Graph for Condition 2, Experiment 3

Based on Balkwell's (1991) path length values, the expectation advantage for Conditions 1 and 2 are given in Table 14. Regression results using these expectation advantages are shown in Table 15.

Condition	Positive Paths, Actor *p*	Negative Paths, Actor *p*	Positive Paths, Actor *o*	Negative Paths, Actor *o*	Expectation Advantage
1 (High Status, Cold Partner)	$f(3), f(4), f(4), f(5)$	*None*	$f(3)$	$f(3), f(4), f(4), f(5)$	0.7790
2 (Low Status, Warm Partner)	*None*	$f(3), f(4), f(4), f(5)$	$f(3), f(4), f(4), f(5)$	$f(3)$	-0.7790

Table 14. Expectation Advantages, Experiment 3

	I	
Constant	0.569	***
	(0.027)	
Status/Warmth	0.078	*
	(0.034)	
N	36	
R^2	0.132	

†p<0.1 *p<0.05 **p<0.01 ***p<0.001

Table 15. Regression on *P(S)*, Experiment 3 (Unstandardized Coefficients)

Unlike Experiment 1, the Experiment 3 manipulations *did* produce a significant effect on *P(S)*.

In order to evaluate Hypotheses 9 and 10, the average *P(S)*, partner competence, and partner warmth were compared to those in Experiment 1. These data are presented in Table 16.

Condition	D+ (Experiment 1 Condition 1)	D+ Low Warmth Partner (Experiment 3 Condition 1)	D− High Warmth Partner (Experiment 3 Condition 2)	D− (Experiment 1 Condition 2)
P(S)	0.625	0.631	0.508	0.564
Partner Competence	4.821	4.778	6.111	6.345
Partner Warmth	2.786	2.500	6.111	3.966
N	28	18	18	29

Table 16. Mean *P(S)* and Partner Expectations for Experiments 1 and 3

The differences in *P(S)* between Conditions 1 of Experiments 1 and 3 and between Conditions 2 of Experiments 1 and 3 are not statistically significant. Therefore, Hypotheses 9 and 10 are not supported by the data.

Discussion

Overall, the hypotheses developed for Experiment 3 were not supported: there were no significant differences between Conditions 1 or Conditions 2 of Experiments 1 and 3. The lack of significant differences between these conditions may be due to the non-significant findings of the first experiment.

Unlike Experiments 1 and 2, the manipulations of Experiment 3 produced significant main effects on resistance to influence. While the effects of the status and warmth manipulations cannot be dissociated, the non-significant findings of the first two experiments suggests that the warmth manipulation was likely the source of significant variation in *P(S)*. In addition, while not significant, the effect sizes shown in Table 17 contradict the proposition that high warmth has a negative effect of performance expectations. Individuals were *more* likely to be influenced by a high warmth partner, and *less* likely to be influenced by a low warmth partner. Given the small (but statistically significant) negative effect of warmth in Experiment 1 and the apparent positive effect of warmth in Experiment 3, the potential compensation effect of warmth and competence expectations cannot be adequately tested with the current research. A replication of Experiment 1 or a full-factorial experimental design similar to Experiment 3 in which the effects of status and warmth manipulations can be independently evaluated (i.e. two additional conditions where high status partners are low in warmth and low status partners are high in warmth) may clarify the most appropriate way to incorporate warmth expectations and manipulations into the graph formulation of SCT.

One possible explanation for the apparent positive effect of warmth on deference involves the scope condition of collective orientation. As Ridgeway and Johnson (1990) suggest, positive socioemotional behaviors in task groups indicate and facilitate commitment to the group. Dippong (2012) finds that collective orientation decreases the baseline tendency to reject influence in the SES. To the extent that warmth creates an expectation of collective orientation, individuals may be more likely to defer to warm others. This suggests that warmth may operate within task groups in two distinct and contradictory ways. First, as the Bales (1950) data shows, those higher in the power and prestige hierarchy are more likely to express negative socioemotional behaviors. The expectation that high status is associated with cold behaviors is consistent with the model presented here, and supports the assertion that warmth has a negative effect on influence. Second, warmth may indicate a commitment to task success through collective orientation, resulting in a positive effect on influence. In order to disentangle these effects, future research should explicitly measure both the subject's collective orientation and the perceived collective orientation of their partner.

Finally, since the self-evaluations of warmth and competence were administered before the status manipulation in Experiment 3, these evaluations can be compared to those in Experiment 1 in order to determine whether the status manipulations in those experiments affected self-evaluations. These evaluations are presented in Table 17. Based on a MANOVA and Tukey's HSD, neither of the conditions of Experiment 1 differ significantly from the self-evaluations reported

in Experiment 3. In conjunction with the non-significant effects of status in Experiment 1, this confirms that the status manipulation in Experiment 1 did not produce significant effects on self-perceptions of warmth and competence, and suggests that the significant findings of Experiment 3 are the product of the warmth manipulation.

	Experiment 1 Condition 1 (High Status)	Experiment 3 Conditions (Pre-Status)	Experiment 1 Condition 2 (Low Status)
	Self	Self	Self
Competent	1.82	2.22	2.34
Confident	1.25	1.67	1.07
Efficient	1.79	1.75	1.62
Foresighted	0.96	1.36	1.14
Intelligent	1.86	1.86	1.66
Skillful	1.50	1.64	1.59
Competence Index	9.18	10.50	9.41
Warm	1.43	1.75	1.90
Friendly	2.18	2.22	2.41
Helpful	1.75	2.17	2.24
Sincere	1.89	2.36	2.14
Tolerant	1.21	1.61	1.93
Trustworthy	2.32	2.61	2.69
Warmth Index	10.79	12.72	13.31

Table 17. Self-Evaluations of Warmth and Competence, Experiments 1 and 3

Conclusion

The purpose of the research presented here was to demonstrate the validity of conceptualizing general performance expectations in terms of warmth and competence. While there was a lack of status effects in the experiments performed, the pooled data from Experiments 1 and 2 supports the proposed

modification to the theory. In addition, the research shows that relative expectations of warmth (in Experiment 1) and competence (in Experiments 1 and 2)produce significant effects on power and prestige behavior. To the extent that future research is able to demonstrate activation of warmth and competence typification states from observable status differences, this formulation can be a useful basis for further elaborations and extensions.

The most significant contribution of the model presented is its potential use within a graded expectations reformulation of SCT. The current formulation of SCT does not address potential variation in status differences within a single characteristic. For example, in the case of continuous diffuse status characteristics such as years of education, the difference in expectations between individuals with 10 and 20 years of education is equivalent to the difference between individuals with 14 and 15 years of education. It also treats different status characteristics as producing expectations that are identical, e.g. that gender differences produce the same effect on power and prestige behavior as differences in ethnicity. One notable recent attempt to address the first limitation and develop a quantitative method is that described by David Melamed (2012). In his model, path lengths for continuous status characteristics are weighted based on the distribution of the characteristic in the population. Based on his research, this approach produces estimates of relative expectations that are significantly better than those suggested by the ordinal approach in the original formulation. However, it focuses on differences *within* characteristics; it does not address potential differences *between* them. For example, does

education activate expectations that are equivalent in strength to occupational prestige? Is gender as powerful as ethnicity? Do diffuse and specific status characteristics produce expectations of the same magnitude? Melamed's (2012) model cannot address these types of questions. If *all* status characteristics activate expectations of warmth and competence, we can use the size of these expectations to weight paths in the graph models. In other words, these expectations are potentially useful for developing a general graded expectations approach that can distinguish the strength of expectations both within and between status characteristics.

Another potential benefit of the proposed formulation is that it utilizes status typification states, which have been incorporated into a number of expectation states theories. For example, Fişek, Berger, and Norman (1991) introduce an integration between SCT and Power and Prestige Theory. This integration addresses the effects of group interaction that is inconsistent with the expectations produced by status differences. For example, when a high status individual consistently produces low-value contributions to the group during interaction, how are the expectations for that individual affected? Fişek et al. (1991) suggest that inconsistent patterns of behavior activate status typification states, which have an effect on expectations equivalent to a status characteristic. If the expectation advantage produced by status characteristics also derive from status typification states, the basis for this assertion becomes clear. In addition, common cognitive elements in both theories simplifies further elaborations and extensions involving these theories. Status typification states are also utilized by

Berger, Ridgeway, and Zeldith (2002) in their integration of Status Construction Theory and Reward Expectations, which describes the process by which characteristics initially obtain status value. They suggest that status typifications play an important role in this process. Utilizing status typification states in SCT highlights that the same process that creates status value plays an important role in the maintenance and reproduction of status characteristics in everyday interaction.

Third, the introduction of warmth and competence judgments into SCT creates a connection between two extensive bodies of research, improving the theoretical fertility of both research programs. For example, recent work within SCT by Jeffrey Lucas and Jo Phelan (e.g. Lucas and Phelan 2012) attempts to conceptualize stigma in terms of the theory. SCM research has also addressed the issue of stigma (e.g. Sadler, Meagor, and Kaye 2012), which suggests that ideas from both research programs can shed light on stigmatized identities. Another interesting study by David Pedulla (2014) examines the expectations derived from multiple status characteristics. Specifically, Pedulla is interested in how multiple characteristics associated with low status combine. In his research, he shows that (inconsistent with the predictions of SCT) homosexual orientation has a *positive* effect on expectations for black men. He explains this by referencing the contradictory warmth expectations associated with homosexuality and black Americans. Incorporating warmth expectations in SCT may help address this finding. As warmth is an affective state, its introduction may also contribute to the further development of affective theories within

Expectation States research. In terms of the standard experimental setting, the inclusion of warmth expectations also suggests a number of theoretically interesting protocol modifications. For example, reducing the self-other outcome dependence of the group task should increase the importance of warmth evaluations. Making the task more competitive (less cooperative) should also affect judgments of warmth. We might also change the task goal to one in which the instrumental characteristic (C*) is associated with low status (e.g. expressive tasks) and examine the effects on social judgments. The integration of SCT and SCM is also beneficial to theoretical and empirical development in SCM. For example, SCT research emphasizes the behavioral outcomes that status distinctions produce. SCM makes a number of conclusions about the implications of warmth and competence expectations on forms of discrimination, but primarily uses attitude surveys in its research. SCT can provide a framework for measuring and understanding the behavioral consequences of social judgements.

Finally, this research can be used in the service of applied sociology, particularly in the classroom. Complex Instruction[8] is an instruction style pioneered by Elizabeth Cohen (e.g. Cohen 2002; Cohen and Lotan 2003, 1997) to achieve equality in the classroom. The program involves instructional strategies implemented by teachers, classroom exercises meant to allow all students to demonstrate competence, and the treatment of status problems. By understanding the core expectations that status differences engender, more

[8] http://cgi.stanford.edu/group/pci/cgi-bin/site.cgi?page=index.html

precisely targeted status interventions might be developed. There is also a substantial amount of research and theory on the legitimacy challenges faced by women in positions of power in the workplace (e.g. Proudford 2009; Ridgeway, Johnson, and Diekema 1994; Kanter 1977). One recommendation for overcoming legitimacy challenges is for low-status authority figures to emphasize positive socio-emotional behaviors (Ridgeway and Johnson 1990). Incorporating warmth expectations into SCT can illuminate the potential consequences of this strategy.

In conclusion, if warmth and competence expectations are a valid representation of general performance expectations activated by observable differences in status characteristics between group members, the integration of SCT with SCM provides a number of opportunities for elaboration and integration within the Expectation States research program. It also creates potential for Expectation States research to expand into novel theoretical subjects and develop more effective forms of status interventions. A number of these potential avenues for further research have been highlighted here, though there are certainly a much greater number of possibilities for future exploration.

Appendix A: Graph Construction and Calculating Expectation Advantage

One of the major improvements in the 1977 presentation of Status Characteristics Theory (Berger, Fişek, Norman, and Zelditch Jr. 1977) is the incorporation of graph theory to represent status in groups, which allows for the calculation of an expectation advantage. This appendix presents the definitions, rules, and assumptions that relate to graph construction and expectation calculation.

> **DEFINITION 3 (Relevance)** Element e_i is relevant to element e_j if and only if when x possesses e_i, then x expects or is expected to possess e_j.
>
> **DEFINITION 4 (Dimensionality)** *Dimensionality* exists between e_i and e_j if and only if e_i and e_j are oppositely evaluated states of the same characteristic.

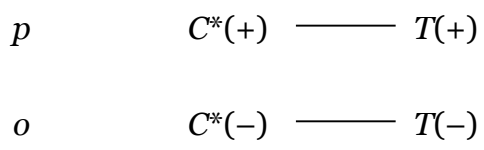
These definitions, in combination with scope conditions regarding the group task, provide us with the basic graph elements and relations necessary for the initial graphing of a task situation. Any group task can be represented as:

$$C^*(+) \text{ ——— } T(+)$$

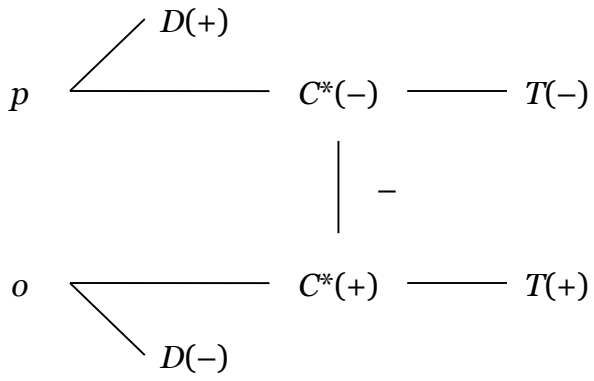
$$C^*(-) \text{ ——— } T(-)$$

The substantive interpretation of this graph is that there exists a positive and negative outcome for the group task T, and a relevant particular characteristic C^* that is instrumental to the task. Characteristics appear as points on the graph,

while relevance is expressed by a line connecting the two points. Actors within the group task are also represented by points:



The focal actor is generally represented by a *p*, while other actors are labeled with the letter *o*, using numerical subscripts when necessary. Lines connecting actors to characteristics indicate possession. To highlight the basic elements of the graph, take the following situation: a male and female are trying to estimate the number of pennies in a jar. Both have been tested for spatial ability, which has been determined to be of importance to the task; the female tested higher in this quality than the male. The graphical representation of this example is given below.



In this case, the male is actor *p* and the female is actor *o*. The actors possess different states of a diffuse status characteristic *D* (sex) as well as different states

of the relevant particular characteristic (as evidenced by their differing spatial abilities). Note the negative line connecting the relevant particular characteristic; this represents dimensionality. The sign of this line is necessary for graph calculations, and will be discussed at length later. Lastly, a few restrictions regarding relations between elements are important for basic graphing purposes:

1. The possession relation can exist only between an actor and a state of a characteristic or a state of a goal-object.
2. The relevance relation can exist between points representing any two elements in our system, except where one or both points represent actors in the situation, or the points represent oppositely evaluated states of the same "type" of element, i.e., oppositely evaluated states of the same characteristic, goal-object, activated or induced element, or the same task.
3. The dimensionality relation can exist only between two oppositely evaluated states of the same characteristic that are possessed by actors in the situation.

These restrictions serve to distinguish between the different types of relations, represented as lines in the graph. The most important distinction, as far as graph calculation is concerned, is between dimensionality and the other two relations; this is due to the negative valence associated with dimensionality mentioned above.

The next section of the theory addresses construction of graphs for particular task group situations. Two important processes are introduced at this point. First, the theory addresses the method by which the saliency of any particular status characteristic is ascertained. Second, the means by which status characteristics are associated with task outcome expectations is discussed.

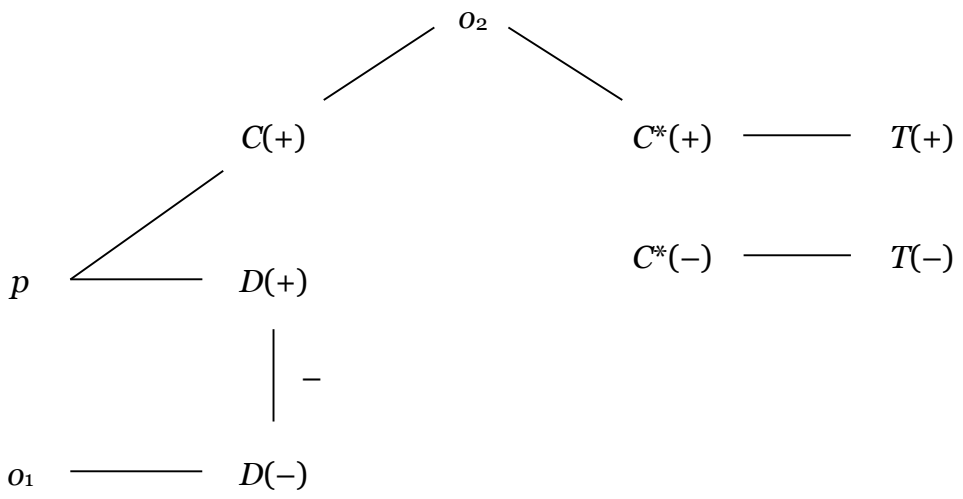
ASSUMPTION 1 (Salience Completion Process)

1. Given existing paths connecting an interactant to outcome states of the group task the elements and relations in these paths become salient in the task situation; and
2. Given status characteristics that provide a basis for discrimination between interactants the states of these characteristics become salient in the task situation.

RULE 1 (Diagramming the Saliency Structure)

1. Determine what elements are salient in the task situation by:
   a. definition of the task group; and
   b. application of the salience completion assumption.
   Represent each by a point in the diagram.
2. Determine the relationships among the salient elements in the situation. Draw in a line with a positive sign for every possession and relevance relation that holds between the elements. Draw in a line with a negative sign between two oppositely evaluated states of a characteristic if both states are possessed by actors in the situation.

Using an illustration from Berger et al. (1977): given that actor *p* possesses the positive states of a diffuse status characteristic and a specific status characteristic, actor o_1 possesses the negative state of the same diffuse status characteristic, and actor o_2 possesses the positive states of the specific status characteristic and the relevant particular status characteristic, the situation is diagramed as follows:



The uppermost path is salient, as actor *p* is connected to the task outcome (through actor o_2). The diffuse status is salient as well, since it discriminates between the two actors. Note the dimensionality line between the states of *D*, per Rule 1.

The second process is referred to as the burden of proof process (discussed earlier in this paper). It is activated when there are status characteristics salient in the graph, but not connected to a particular task outcome. In the previous illustration, the diffuse status characteristic is salient (as it provides a means of discrimination between the actors) but not associated with the task outcome. The burden of proof assumption states that, unless a status characteristic is specifically disassociated from the task component of the situation, actors will behave as if it is relevant.

ASSUMPTION 2 (Burden of Proof Completion Process)
Given that a salient status element, possessed or connected to an interactant, is not connected to the task, or is connected by an existing path of length 5 or greater, then:

3. If the status element is the state of a diffuse characteristic, the associated generalized expectation state will be activated, and it will become relevant to a similarly evaluated state of C^*.
4. If the status element is the state of a specific characteristic, its relevant task outcome state will be activated. This task outcome state will be activated. This task outcome state will become relevant to a similarly evaluated state of abstract task-ability and the latter will become relevant to a similarly evaluated outcome state of the group task.

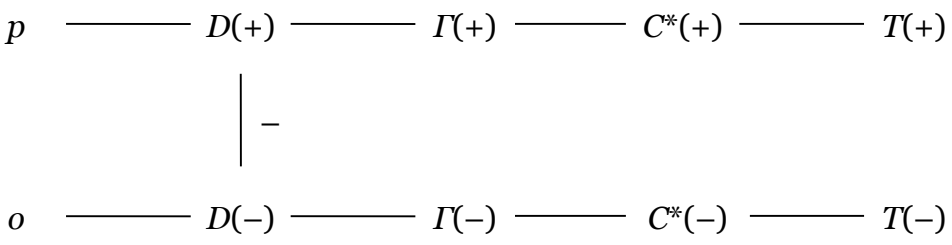
RULE 2 (Diagramming Burden of Proof Structure)

1. Determine what new elements are activated and/or induced, $\tau_i(\pm)$, $\Gamma_i(\pm)$, $Y(\pm)$:
   a. given the existing salience structure; and
   b. by application of the burden of proof completion assumption.

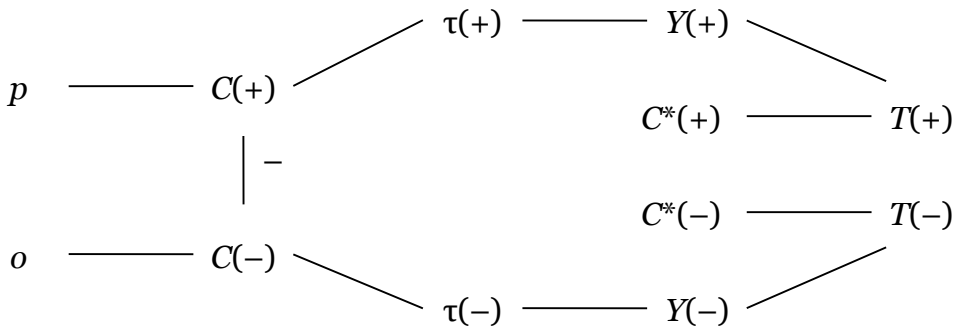
   Represent each activated and/or induced element by a point in the diagram.

2. By application of the burden of proof assumption determine relevance relations among the new elements in the situation. Draw a line with a positive sign for each new relevance relation that holds between these elements.

For diffuse status characteristics not explicitly associated with task outcomes, the burden of proof process operates as follows:



Gamma represents the generalized expectation state associated with *D*, and links the diffuse status characteristic to the task outcome. Unless the belief regarding relative capacity is explicitly disassociated from the specific characteristic that is instrumental to the task, actors will behave as if it is relevant. This creates an inferred path between the diffuse status characteristic and task outcome. The burden of proof process operates in a similar way with specific status characteristics:



In this case, the specific task ability associated with *C* becomes activated (as the tau element shown). Ability to perform a specific task is then generalized to abstract task ability, represented by upsilon, which is then associated with success or failure at the current group task *T*.

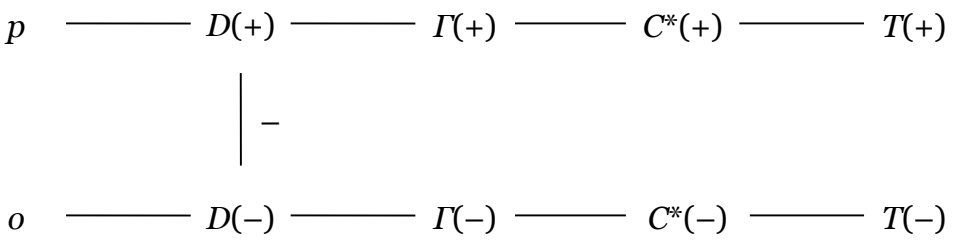
The final graph construction assumption addresses the impact of a change in interactants. It states that once a structure has been created via the salience and burden of proof processes, activated elements and relations remain in the graph as long as the actor is in the situation.

ASSUMPTION 3 (Sequencing of Structure Completion) A given structure will be developed through the saliency and burden of proof processes for the interacting actors. If a noninteracting actor should later become an interactant, then the structure will be further developed through the operation of the structure completion process. For any actor, those parts of his structure completed in relation to a former interactant remain while the actor is in the given situation S^*.

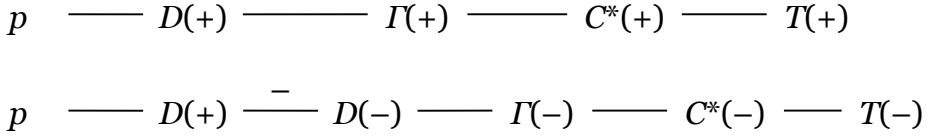
The theory next explains how the graph structure is utilized to calculate performance expectations for the focal actor. The first concern is calculation of the algebraic sign for each path.

RULE 3 (Sign of a Path) The sign of a path from an actor to a task outcome is determined by the algebraic product of the signs of the lines constituting the path and the evaluational sign of the task outcome that is the final point of the path.

Take the following graph:



There are two paths connecting focal actor p to task outcomes. They are:

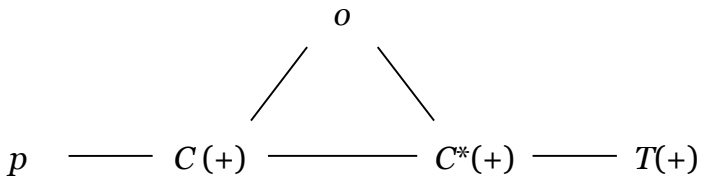


The first path of task expectancy has four positive lines (one possession and three relevance) and a positive task outcome. The product of these five signs is positive, making the first path positive. If the diffuse status characteristic is gender, the substantive translation of the graph is that *p* believes that he, as a male, is generally more intelligent than actor *o*, and that this intelligence will allow him to perform the instrumental characteristic well, resulting in task success (relative to actor *o*). The second path of task expectancy has four positive lines and one negative line of dimensionality. It also has a negative task outcome. The product of four positive signs and two negative signs is positive, resulting in a positive path. Continuing the gender illustration, actor *p* believes that he will be more successful at the task since he is not a woman, who he expects to be less capable at the task due to her inferior intelligence.

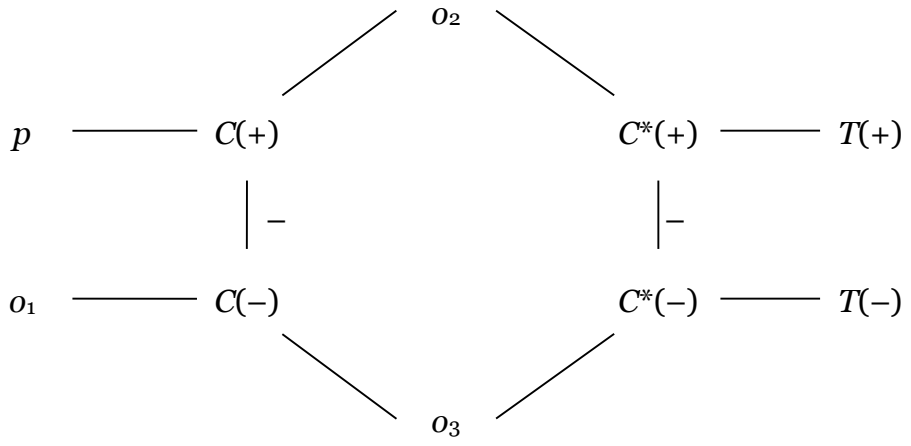
The next rule simplifies the graph structure by eliminating redundant and ineffective paths.

> **RULE 4 (Effective Paths)** The paths effective in determining expectations for an actor *x* are all paths linking the actor to one of the task outcomes, with the following exceptions:
>
> 1. Paths of length greater than 6 are not effective.
> 2. If the graph contains a line joining two points neither of which is an actor, then any path containing a subpath of length 2 or more joining these same two points is not effective.
> 3. If there is a path connecting an actor to a task outcome, then any second path to the *same* task outcome of equal or greater length with the *same* sign is not effective if it has more negative lines than the first path.

This rule explains that path length is inversely proportional to the strength of the expectation formed. Therefore, the longer the path, the weaker the expectation created. A limit of six for effective path length has been inferred from empirical data. The second point, regarding subpaths, is illustrated in the following example:



In this case, there is only one effective path of length three. The subpath that includes actor *o* is not effective, since there is a relevance line connecting *C* to *C**. That actor *o* possesses these characteristics adds no new information about expectations for *p*. The last point in Rule 4 relates to dimensionality lines. Given the following graph, actor p has three effective paths.



The path

$$p \;\text{——}\; C(+) \;\overline{\text{——}}\; C(-) \;\text{——}\; o_3 \;\text{——}\; C^*(-) \;\overline{\text{——}}\; C^*(+) \;\text{——}\; T(+)$$

is not effective, since it contains more negative lines than a different path with the same sign (positive) going to the same outcome $T(+)$.

We now turn to calculating an aggregated expectation based on the salient paths in a graph. This calculation includes two key concepts. The first is attenuation, i.e. the combined strength of two consistent paths is less than their arithmetic sum. It is believed that additional expectations of like sign contribute marginally to the actor's overall expectation. The second important concept is that of combining inconsistent information. Once sets of consistent information are aggregated, these sets are combined to produce an overall expectation.

ASSUMPTION 4.1 (Formation of Aggregated Expectation States: Combining Paths of Like Signs) If an actor x is connected to the outcome states of the group task by paths of like sign, and strengths $f(i) \ldots f(n)$, then these paths are combined to yield an aggregated expectation value e for the actor x according to the following rule:

$$e_x = \begin{cases} e_x^+ & \text{if the paths are positive} \\ e_x^- & \text{if the paths are negative} \end{cases}$$

where

$$e_x^+ = \left[1-\left(1-f(i)\right)\text{K}\left(1-f(n)\right)\right] \text{ and}$$

$$e_x^- = -\left[1-\left(1-f(i)\right)\text{K}\left(1-f(n)\right)\right].$$

ASSUMPTION 4.2 (Formation of Aggregated Expectation States: Combining Paths of Unlike Signs) If an actor *x* is connected to the outcome states of the group task by sets of positive paths and negative paths, these paths will first be combined within like-sign subsets to yield a positive-paths value e_x^+ and a negative-paths value e_x^- for *x*. The entire set of paths will be combined by adding the negative-paths value to the positive-paths value to yield an aggregated expectation value *e* for *x*. That is, $e_x = e_x^+ + e_x^-$.

As an example, suppose actor p has two positive paths with values of 0.5 and 0.3, and two negative paths with the values 0.3 and 0.1. First, we calculate the aggregated positive expectation:

$e_p^+ = \left[1-\left(1-0.5\right)\times\left(1-0.3\right)\right] = 1-0.5\times 0.7 = 1-0.35 = 0.65$. Then, the aggregated negative expectation: $e_p^- = -\left[1-\left(1-0.3\right)\times\left(1-0.1\right)\right] = -\left[1-0.7\times 0.9\right] = -\left[1-0.63\right] = -0.37$. Combining these sets, we arrive at an expectation value of +0.28.

In order to calculate an aggregated expectation value, the value of different path lengths must be determined. All estimations of path length values are based on the assumption that a certain number, *k*, of length-3 paths are equivalent to a path of length 2, *k* length-4 paths are equivalent to a path length of 3, and so on. As a result, all path length values can be determined once *k* and the value of any one path length is known. The Berger et al. formulation derives these values empirically. Balkwell (1991) and Fişek, Norman, and Nelson-Kilger (1992)

theoretically derive *a priori* path values. These three sets of values are summarized in Table I. Theoretically derived values are

TABLE I. Path Length Values

Path Length	2	3	4	5	6
Berger et al.	.8264	.4422	.1768	.0628	.0214
Balkwell	.8099	.4056	.1504	.0498	.0159
Fişek et al.	.6321	.3175	.1358	.0542	.0211

generally more robust than those derived empirically, though Balkwell's (1991) values are sensitive to changes in the assumed asymptotic limits of *k*.

The last theoretical statement in status characteristics theory provides the explicit link between expectations and behavior.

> **ASSUMPTION 5 (Basic Expectation Assumption)** Given that *p* has formed aggregated expectation states for self and other, *p*'s power and prestige position relative to *o* will be a direct function of *p*'s expectation advantage over *o*.

> **ASSUMPTION 5* (Basic Expectation Assumption: A Function for Stay-Response Probabilities)** The probability of an actor's staying with his own choice given a disagreement from another actor with whom he is interacting is given by the following function: $P(S) = m + q(e_p - e_o)$, where *m* and *q* are empirical constants.

This assumption states that the focal actor's rank position in a group is based on his or her aggregated expectation state, relative to the other members in the situation. In other words, the rank position of group members will correlate with

their ranked expectation states. For example, if actor *p* has an expectation advantage over *o*, we expect actor *p* to receive more opportunities to contribute, make more suggestions, and have his contributions evaluated more positively. The corollary to Assumption 5 provides a function relating expectation advantage to a *specific* power and prestige behavior. It states that an actor *p*'s resistance to influence attempts by actor *o* is a direct function of his or her expectation advantage over *o*. Therefore, the actor with an expectation disadvantage will be more likely to defer; high status individuals will have more sway in the group's final decision.

Appendix B: Experiment Protocols

The following is a reproduction of Experiment 2 Condition 1. Experiment 2 Condition 2 is identical with one exception: on screen 23, participants are told that their partner scored 12 on the Meaning Insight test and that they scored 5.

In Experiment 1 Condition 1, screens 1 through 20 are excluded, and any mentions of Meaning Insight on subsequent screens are deleted. On slide 21, individuals are asked their gender, age, and level of education. On screen 23, participants are told that their partner is a current community college student. Experiment 1 Condition 2 is identical to Condition 1, but participants are told that their partner is a current graduate student.

Experiment 3 Condition 1 is identical to Experiment 1 Condition 1, with the following exceptions: screen 88 (self-evaluations of warmth and competence) occurs after screen 22 (demographic questions), and the following screen replaces screen 23:

Thank you for waiting. You are now connected to your partner. Please note the following information, then click "Next" to continue.

You have indicated that **your** current level of education is: **CURRENT UNIVERSITY STUDENT**

Your partner's current level of education is: **CURRENT COMMUNITY COLLEGE STUDENT**

Warmth is an accomodating orientation that frequently benefits others. Those that are warm are often described as friendly, sincere, trustworthy, and helpful.

Your partner scored **LOW** in warmth.

Experiment 3 Condition 2 is identical to Experiment 3 Condition 1, except that the partner's level of education is given as current graduate student and their partner is presented as high in warmth.

Screen 1:

Hello, and thank you for agreeing to participate in this experiment!

We are members of a research team of social scientists who are interested in studying the application of various kinds of perceptual abilities. For the first part of today's study, we are focusing on an important perceptual ability called "Meaning Insight".

Before we begin the study, we would like to learn a bit more about you. After you answer the questions below, please click on the button labeled "Next" to continue.

1. What is your gender?
   - Male
   - Female
   - Other

2. Which of the following ranges includes your age?
   - Less than 18
   - 18-25
   - 26-35
   - 36-45
   - 46-55
   - 56-65
   - 65 or older

Screen 2:

Thank you!

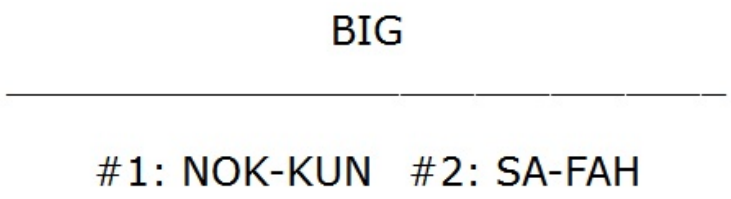
As mentioned on the previous page, the first part of this study involves an ability called "Meaning Insight". In order to gather useful information from your answers, we want to give you as much information as possible about Meaning Insight ability.

First, Meaning Insight is a perceptual ability which is not necessarily related to specialized skills an individual might possess, such as mathematical or artistic ability. That is, it is entirely possible that a person might be a very skilled artist, but not have very much Meaning Insight ability. This means that individuals who do poorly in art or math may in fact be quite accurate in making Meaning Insight judgments.

At the present time, social scientists are not sure what the origins of Meaning Insight are. This is one reason why we are conducting today's study. We are interested in learning more about Meaning Insight ability.

During this part of the study, you will be working with a set of Meaning Insight problems that look like the one shown on the next screen.

Screen 3:



3. Does word #1 or word #2 correspond to the English word? Click on one:
Word #1 Word #2

First, you will see an English word followed by two ancient language words like in the example above. The words will appear for about 5 seconds. You should indicate which of the two ancient language words has the same meaning as the English word. You do this by clicking on one of the buttons above. Click on one of the buttons now, to see how it works.

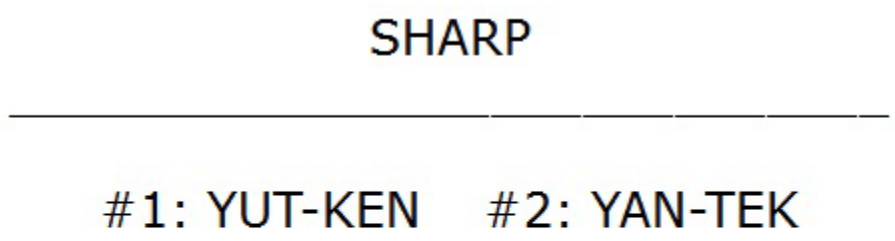
After you have made you selection, click "Next" to continue.

Screen 4:

You will probably find that some of these questions are very difficult to judge. However, there is a right and a wrong answer to each and every slide, and we have found that persons with high Meaning Insight consistently choose more correct answers than those with low Meaning Insight.

Please click "Next" to begin the Meaning Insight questions.

Screen 5:



4. Does word #1 or word #2 correspond to the English word? Click on one:
Word #1 Word #2

Screens 6 through 19 are identical in format to Screen 5. Each screen provides a new meaning insight problem.

Screen 20:

This section of the study is now complete. Please click "Next" to continue with the second part of the study.

Screen 21:

As we mentioned earlier, we are members of a research team of social scientists who are interested in studying the application of various kinds of perceptual abilities. For the second part of this study, we are focusing on a perceptual ability called "Contrast Sensitivity".

In this part of the study, we are going to be studying team ability levels. This means that you will be working with a partner to solve Contrast Sensitivity problems. We are handling today's study this way because of several recent studies which have been done on the effectiveness of individuals working together as a team. For many kinds of problems, these studies indicate that individuals working together perform much more effectively than do individuals who work the same problems alone. For this reason, we will have you work with a partner as a team.

Screen 22:

Most of what we know about how two person teams solve problems comes from studies where the teams discussed problems and solutions to these problems face-to-face. However, advances in video and computer technology are providing more and more opportunities for individuals to work together to solve problems even when face-to-face interaction is not possible. Therefore, the study we are conducting today involves a situation in which the partners do not discuss possible solutions to problems face-to-face, but rather communicate their choices by means of modern communication networks. We have already utilized one part of this network -- the computers we are now using. However, while you will not be solving the problems face-to-face, you will have the opportunity to introduce yourselves to one another by means of the computer system over which you are now receiving these instructions. We find that it helps people who work together to know something about each other.

Let's demonstrate how the computer system works by introducing you to each other. When you click the "Next" button below, you will be connected to your partner. Once connected, you and your partner will be shown your scores on the Meaning Insight exercise from the first part of the study. Click on the button below marked "Next" now to do this.

Intermediate Screen:

Most of what we know about how two person teams solve problems comes from studies where the teams discussed problems and solutions to these problems face-to-face. However, advances in [illegible] and more opportunities for indivi[illegible]n face-to-face interaction is not [illegible]oday involves a situation in which the p[illegible]ms face-to-face, but rather communicat[illegible]n networks. We have already utilized o[illegible]w using. However, while you will not be s[illegible] opportunity to introduce yourselves t[illegible]ver which you are now receiving these instructions. We find that it helps people who work together to know something about each other.

Please wait while we connect you to your partner.
This may take a few moments.

Let's demonstrate how the computer system works by introducing you to each other. When you click the "Next" button below, you will be connected to your partner. Once connected, you and your partner will be shown your scores on the Meaning Insight exercise from the first part of the study. Click on the button below marked "Next" now to do this.

Screen 23:

Thank you for waiting. You are now connected to your partner. Please note the following information, then click "Next" to continue.

Your score on the Meaning Insight exercise was: **12**

Your partner's score on the Meaning Insight exercise was: **5**

NATIONAL STANDARDS
FOR MEANING INSIGHT

Individual Scores

Superior	12 – 15
Average	7 – 11
Poor	0 – 6

The table above provides the national standards from previous Meaning Insight research. As you can see, your score is associated with **SUPERIOR** performance, while your partner's score is associated with **POOR** performance.

Screen 24:

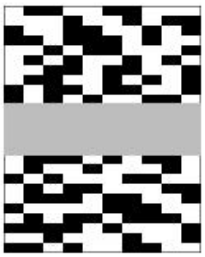
Because the two of you will be working as a group today, we want to give both of you as much information as possible about Contrast Sensitivity ability.

First, like Meaning Insight, Contrast Sensitivity is a perceptual ability which is not necessarily related to specialized skills an individual might possess, such as mathematical or artistic ability. That is, it is entirely possible that a person might be a very skilled artist, but not have very much Contrast Sensitivity ability. This means that individuals who do poorly in art or math may in fact be quite accurate in making Contrast Sensitivity judgments.

Also like Meaning Insight, at the present time, social scientists are not sure what the origins of Contrast Sensitivity are.

During this part of the study, you and your partner will be working with a set of Contrast Sensitivity problems that look like the one shown on the next screen.

Screen 25:



This form of the test asks you to examine two patterns and select which of the two patterns contains the greater amount of white area.

You will probably find that some of these slides are very difficult to judge. This is due to the fact that the difference in the amount of white area between the two patterns is sometimes quite small. However, there is a right and a wrong answer to each and every slide, and we have found that persons with high Contrast Sensitivity consistently choose more correct answers than those with low Contrast Sensitivity. It is also the case that persons with high levels of Contrast Sensitivity ability may not be completely aware of how it is that they choose the right answer. They seem to be operating on the basis of very slight, almost intuitive cues and feelings. However, it is best to be cautious; guesses which are based on first impressions may often be incorrect.

Screen 26:

As noted, we are interested in how individuals and groups use their Contrast Sensitivity to solve problems. We have observed that in many situations, such as when a doctor diagnoses a difficult illness, individuals are called upon to make decisions that must be correct. That is, if the doctor does not make the right diagnosis, the patient might die. Social scientists refer to this kind of situation as a Critical Choice situation.

In Critical Choice situations, when the person is concerned only with the correctness of the decision, he or she will often seek all the information and advice from others that is available. Because the most important thing in a Critical Choice situation is to be right, individuals will not care whether they or others first realize what the appropriate decision is, so long as the decision is the correct one. It is clear then, that exchanging information with others can often lead to more correct decisions than an individual could make working alone.

In this study, we are interested in examining this kind of teamwork situation in greater detail. Consequently, we are going to give the two of you the opportunity to exchange information with each other as to what each of you think is the correct answer for each problem before you make your final decisions. You will use buttons that will appear on your computer screen to exchange this information with each other.

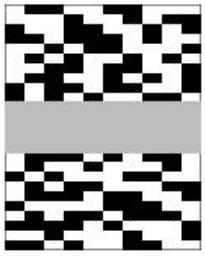
Screen 27:

This is how it will work...

First, we will present a slide on the screen. The slide will be visible for five seconds. After you have each studied the slide, you should make an initial choice as to which pattern contains the greater area of white -- the top pattern or the bottom pattern. This initial choice will let your partner know whether you think that the top figure or the bottom figure contains the greatest area of white. You will each indicate this choice by answering the question on your screen which asks "Which of the above contains more white?"

The next screen of instructions illustrates this...

Screen 28:

19. 

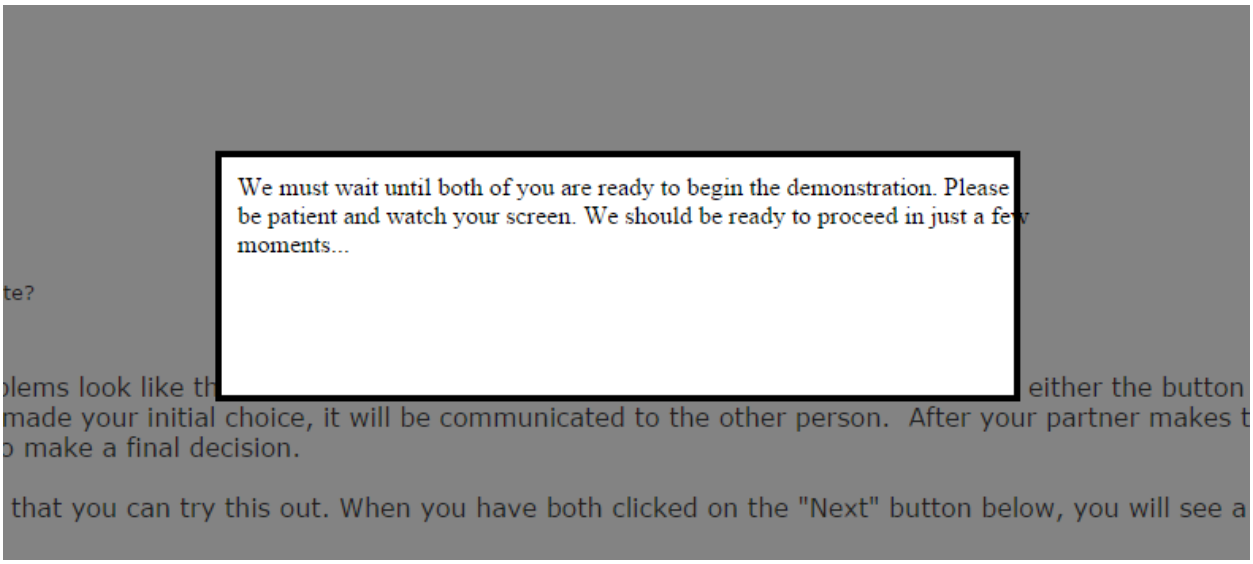
Which of the above contains more white?

- Top
- Bottom

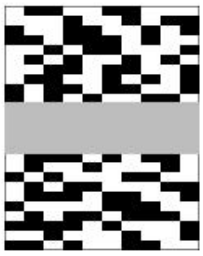
The group Contrast Sensitivity problems look like the question above. You express your initial opinion by pressing either the button marked "Top" or the button marked "Bottom." When you have made your initial choice, it will be communicated to the other person. After your partner makes their choice, you will see their decision and have an opportunity to make a final decision.

Let's go through a practice trial, so that you can try this out. When you have both clicked on the "Next" button below, you will see a screen with a picture of a Contrast Sensitivity problem.

Intermediate Screen:



Screen 29:

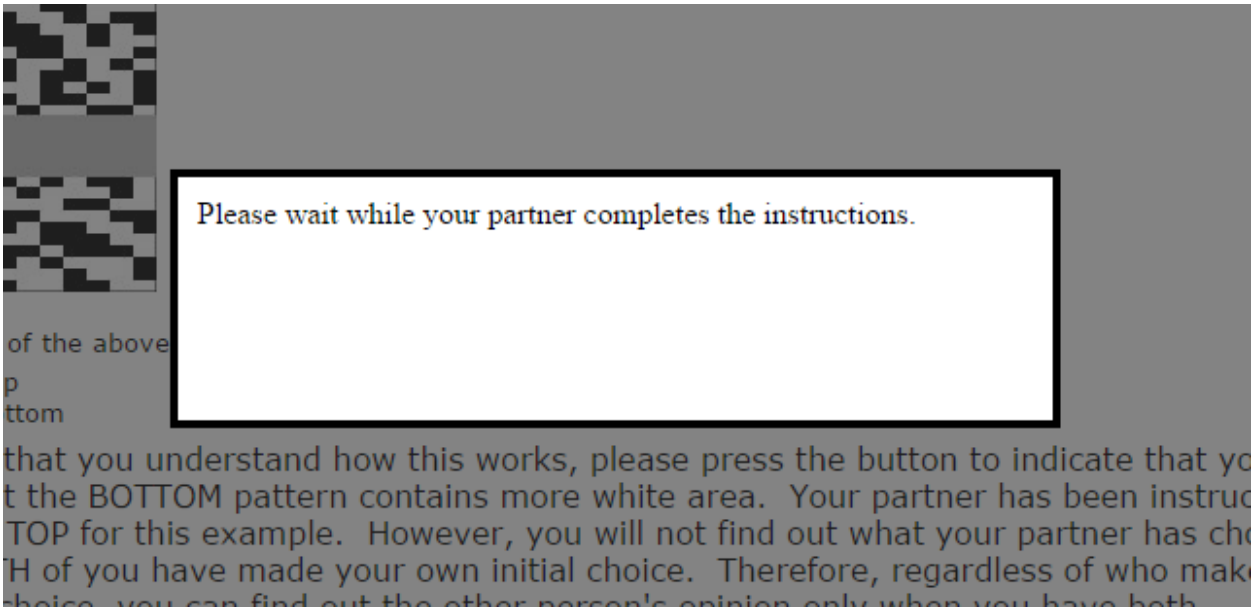
20. 

Which of the above contains more white?

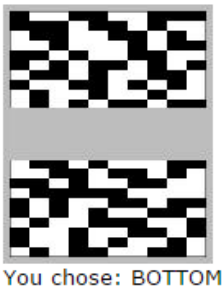
- Top
- Bottom

To show that you understand how this works, please press the button to indicate that you think that the BOTTOM pattern contains more white area. Your partner has been instructed to select TOP for this example. However, you will not find out what your partner has chosen until BOTH of you have made your own initial choice. Therefore, regardless of who makes the first choice, you can find out the other person's opinion only when you have both selected an answer to the question.

Intermediate Screen:



Screen 30:



You chose: BOTTOM
Your partner chose: TOP

21. What is your final decision?

○ Top ○ Bottom

Each of you should now be able to see both your own opinion and that of your partner. In this case, the results indicate that the two of you disagreed this time, since you chose BOTTOM and your partner chose TOP.

During the slide series, after each of you has received information on the other person's opinion, you will have five more seconds to decide which is the correct answer. You should each restudy the slide and carefully evaluate your partner's advice. You should use this advice if it helps you make the right decision. When you have made your final choice, you will indicate your decision by answering the question "What is your final decision?" This question is for making final choices only, and they register only your own decision.

Now, both of you should go ahead and make a final choice by answering the question "What is your final decision?" After you have answered the question, select "Next" to continue.

Screen 31:

As you can see, you will not see your partner's final choice in today's study. After both members of your team have made their final decisions, they will be recorded, and the next Contrast Sensitivity problem will appear on the screen.

Screen 32:

Now, we will explain our scoring procedures...

As we have explained, you will be working together on 25 Contrast Sensitivity slides. Once the slide appears on your screen, you will have five seconds to make your initial choices as to which pattern contains the greater area of white. Then, after you see your partner's choice, you will have five more seconds in which to make your final choices.

Each time that a team member makes a correct final decision, the team will receive 1 point. If both team members make the correct final choice, the team will receive 2 points. If an individual makes an incorrect final decision, then that person's final decision adds nothing to the team score for that trial. Your team score will consist of the total number of correct final decisions made by both of you. Since there will be 25 trials, the maximum score your team can achieve is 50 points. This means that you both have equal responsibility for your team score. At the end of the experiment, your team score will be used to determine your earnings.

On the next screen, we will show you the pattern of scores that has been compiled from previous studies involving Contrast Sensitivity Ability.

Screen 33:

NATIONAL STANDARDS
FOR CONTRAST SENSITIVITY

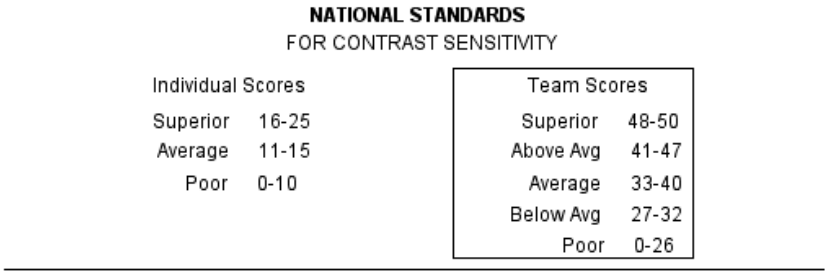
Individual Scores	
Superior	16-25
Average	11-15
Poor	0-10

Team Scores	
Superior	48-50
Above Avg	41-47
Average	33-40
Below Avg	27-32
Poor	0-26

First, we have found that when individuals work alone at solving Contrast Sensitivity problems, 0 to 10 is a poor performance. 11 to 15 represents an average performance, and 16 to 25 is clearly a superior performance.

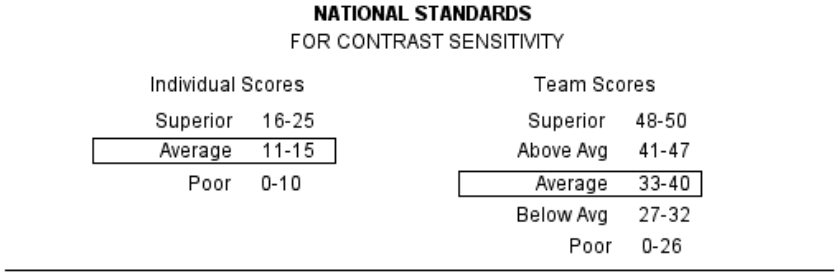
Individuals can improve their scores substantially if they are given the opportunity to see another person's initial choice before having to make a final decision.

Screen 34:



In today's study, we are interested in seeing how well you can work together as a team. When people work together as partners, it has been found that a team score falling between 0 and 26 constitutes a very poor team performance. A team score of 27 to 32 is below average performance. Scores of 33 to 40 represent an average team performance. 41 to 47 points represents an above average score. And, 48 to 50 points clearly represents a superior team performance.

Screen 35:



As you can see from these standards, it has been demonstrated that teams working together are able to perform more effectively than two individuals working independently. For example, an individual with average ability working on these problems alone could expect to get between 11 and 15 correct. Thus, you might expect that two individuals working together might each get between 11 and 15 correct for a total score between 22 and 30. However, as the team results show, the average team score is quite a bit higher -- between 33 and 40. This is because two people working together as a team, and exchanging information with each other can do better than two individuals working alone.

Screen 36:

Before we begin the Contrast Sensitivity Problems, we would like to summarize a few points...

1. You will be shown a series of 25 slides and will be asked to decide whether the top figure or the bottom figure contains more WHITE area.

2. Only your final decision on each slide will count toward your team score.

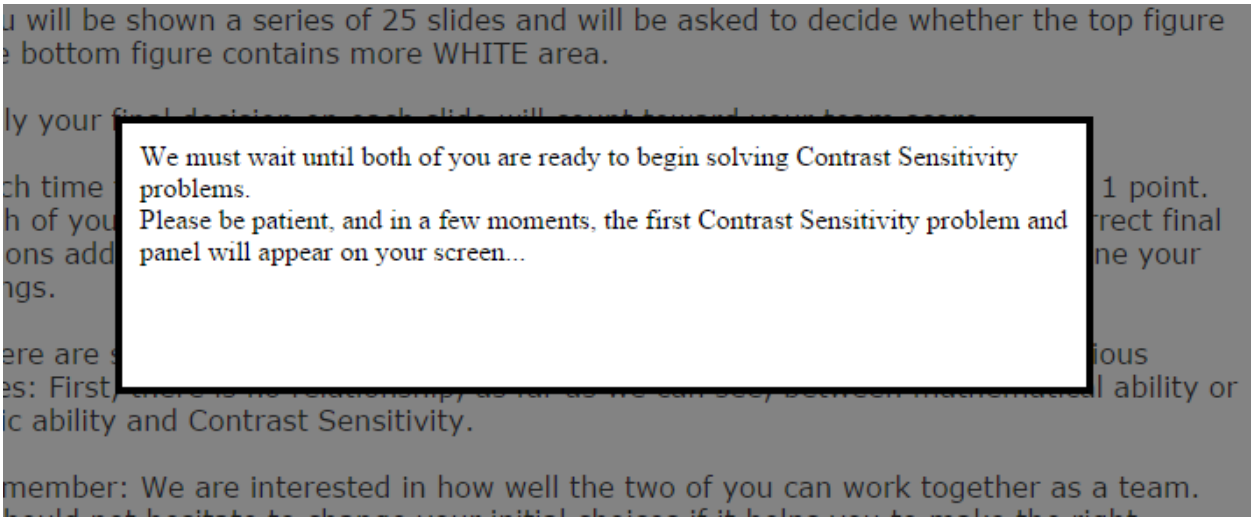
3. Each time that one of you makes a correct final decision, your team will receive 1 point. If both of you choose correctly, your team receives 2 points. This means that incorrect final decisions add nothing to your team score. Your team score will be used to determine your earnings.

4. There are some things we know about Contrast Sensitivity ability from our previous studies: First, there is no relationship, as far as we can see, between mathematical ability or artistic ability and Contrast Sensitivity.

5. Remember: We are interested in how well the two of you can work together as a team. You should not hesitate to change your initial choices if it helps you to make the right decision for your team.

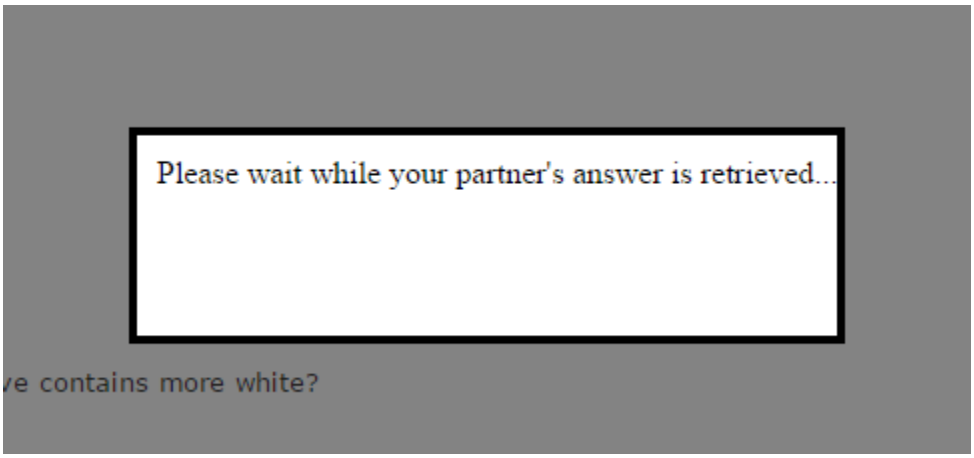
6. Finally, after studying the slide, please make your choice as quickly as possible.

Intermediate Screen:



Screen 37:

Intermediate Screen:



Screen 38:

Screen 39 through 86 are identical to screens 37 through 38, with each new contrast sensitivity problem presenting a different pattern and 20 of 25 problems indicating that the partner's choice differed from the participant.

Screen 87:

This part of the study is now complete. While the computer is tabulating your team's score, we would like to ask you a few questions. To begin answering these questions, click on the "Next" button below.

Screen 88:

For the following questions, please indicate the extent to which the following terms describe YOU.

	Not at all like me						Very much like me
72. Friendly	○	○	○	○	○	○	○
73. Sincere	○	○	○	○	○	○	○
74. Efficient	○	○	○	○	○	○	○
75. Helpful	○	○	○	○	○	○	○
76. Competent	○	○	○	○	○	○	○
77. Tolerant	○	○	○	○	○	○	○
78. Skillful	○	○	○	○	○	○	○
79. Foresighted	○	○	○	○	○	○	○
80. Confident	○	○	○	○	○	○	○
81. Warm	○	○	○	○	○	○	○
82. Intelligent	○	○	○	○	○	○	○
83. Trustworthy	○	○	○	○	○	○	○

Screen 89:

For the following questions, please indicate the extent to which the following terms describe YOUR PARTNER. We understand that your interaction with your partner was limited; please do your best.

	Not at all like my partner						Very much like my partner
84. Competent	○	○	○	○	○	○	○
85. Tolerant	○	○	○	○	○	○	○
86. Skillful	○	○	○	○	○	○	○
87. Warm	○	○	○	○	○	○	○
88. Confident	○	○	○	○	○	○	○
89. Efficient	○	○	○	○	○	○	○
90. Helpful	○	○	○	○	○	○	○
91. Foresighted	○	○	○	○	○	○	○
92. Sincere	○	○	○	○	○	○	○
93. Trustworthy	○	○	○	○	○	○	○
94. Intelligent	○	○	○	○	○	○	○
95. Friendly	○	○	○	○	○	○	○

Screen 90:

96. Compared to your partner, who would you say has more contrast sensitivity ability?

I have much more ability than my partner			My partner and I have equal Contrast Sensitivity ability			My partner has much more ability than I
○	○	○	○	○	○	○

97. Based on your test scores, did you or your partner have more Meaning Insight ability?

- ○ I had more Meaning Insight ability than my parnter
- ○ My partner and I had equal Meaning Insight ability
- ○ My partner had more Meaning Insight ability than me

98. Compared to your partner, how do you think you did at the group task today?

I was much better at the task than my partner			My partner and I did equally well			My partner was much better at the task than I
○	○	○	○	○	○	○

Screen 91:

For the following questions, you will be asked how you compare to your partner on certain traits.

	My partner much more than me			The same as my partner			Me much more than my partner
99. Warm	○	○	○	○	○	○	○
100. Skillful	○	○	○	○	○	○	○
101. Trustworthy	○	○	○	○	○	○	○
102. Efficient	○	○	○	○	○	○	○
103. Helpful	○	○	○	○	○	○	○
104. Foresighted	○	○	○	○	○	○	○
105. Sincere	○	○	○	○	○	○	○
106. Confident	○	○	○	○	○	○	○
107. Friendly	○	○	○	○	○	○	○
108. Intelligent	○	○	○	○	○	○	○
109. Tolerant	○	○	○	○	○	○	○
110. Competent	○	○	○	○	○	○	○

Screen 92:

Thank you for completing the survey!

Before we arrange for payment, we would like to explain the experiment in a bit more detail. As we indicated in the second part of this experiment, we are interested in how groups work together making decisions. However, while Contrast Sensitivity is an actual ability (http://en.wikipedia.org/wiki/Contrast_%28vision%29#Contrast_sensitivity), the test you took today does not measure this ability. In reality, we are interested in exploring the extent to which you deferred to your partner in cases of disagreement. Because this requires there to be a certain number of disagreements, you were not actually interacting with another individual. The partner choices were determined by the computer depending on your answers.

One factor that affects people's likelihood of deferring to their partners is perceived differences between them. The purpose of the first part of the experiment was to create just such a difference (in this case, differences on Meaning Insight ability). Similar to Contrast Sensitivity, Meaning Insight is not an actual ability, and individual scores were assigned by the computer.

We apologize for the deception, but felt it was necessary to avoid any bias in participant decisions. Since the consent form you agreed to at the beginning of the experiment omitted these details, you may withdraw your consent if you wish. If you chose to do so, your data will be deleted.

111. If you would like to withdraw your consent, or you have any concerns, comments, or questions about the experiment today, please indicate so below and inform the Principle Investigator when they enter the room.

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