

Forming Impressions of Personality

A Replication and Review of Asch's (1946) Evidence for a Primacy-of-Warmth Effect in Impression Formation

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Abstract. Asch's seminal research on "Forming Impressions of Personality" (1946) has widely been cited as providing evidence for a primacy-of-warmth effect, suggesting that warmth-related judgments have a stronger influence on impressions of personality than competence-related judgments (e.g., Fiske, Cuddy, & Glick, 2007; Wojciszke, 2005). Because this effect does not fit with Asch's Gestalt-view on impression formation and does not readily follow from the data presented in his original paper, the goal of the present study was to critically examine and replicate the studies of Asch's paper that are most relevant to the primacy-of-warmth effect. We found no evidence for a primacy-of-warmth effect. Instead, the role of warmth was highly context-dependent, and competence was at least as important in shaping impressions as warmth.

Keywords: replication, primacy-of-warmth, person perception

Social psychological laboratories have undergone considerable change since the publication of Asch's "Forming Impressions of Personality" in 1946, leading to the inevitable demise of punch cards and slide carousels in favor of more advanced experimental equipment. Still, the basic methodology underlying present-day person perception research is strongly grounded in Asch's paradigm-shifting paper, in which impression formation was studied in a controlled laboratory setting, yielding high internal validity and experimental precision (Fiske, Cuddy, & Glick, 2007; Gilbert, 1998). Beyond the methodological realm, Asch's studies have also laid much of the groundwork for influential theories about person perception (e.g., attribution theory; Jones & Davis, 1965; the continuum model of impression formation; Fiske, Neuberg, Beattie, & Milberg, 1987).

Written long before the dawn of bite-size science (Bertamini & Munafo, 2012) and the advice to "role-play grandma" to create a clear storyline (Bem, 1987, p. 27), "Forming Impressions of Personality" (Asch, 1946) is as interesting as it is multifaceted. Although there is not one unitary message to be taken from the work (which has been cited over 2,750 times), the message that seems to have most strongly resonated with present-day researchers concerns the primacy-of-warmth effect. Primacy-of-warmth¹ (e.g., Fiske et al., 2007; Wojciszke, 2005) entails that warmth has a primary role in impression formation, in

the sense that warmth-related information has a stronger influence on impressions than competence-related information (Wojciszke, Bazinska, & Jaworski, 1998).

The present research aims to critically examine the evidence that Asch's (1946) research provides for the primacy-of-warmth effect. Moreover, we conducted a direct replication of those studies in Asch's publication that are particularly relevant to this effect. Replication attempts of Asch's work abound (e.g., Ahlering & Parker, 1989; Anderson & Barrios, 1961; Babad, Kaplowitz, & Darley, 1999; Grace & Greenshields, 1960; Hendrick & Constantini, 1970; Kelley, 1950; Luchins, 1948; Luchins & Luchins, 1986; McCarthy & Skowronski, 2011; McKelvie, 1990; Mensh & Wishner, 1947; Pettijohn, Pettijohn, & McDermott, 2009; Semin, 1989; Singh, Onglacto, Sriram, & Tay, 1997; Veness & Brierley, 1963; Wishner, 1960), but most are conceptual rather than direct replications, many are incomplete, few relate to primacy-of-warmth, and some results do not concur with Asch's original findings. Although "Forming Impressions of Personality" has been regarded as a first demonstration of the primacy-of-warmth effect (e.g., Abele & Bruckmüller, 2011; Abele & Wojciszke, 2007; Cuddy, Fiske, & Glick, 2008; Judd, James-Hawkins, Yzerbyt, & Kashima, 2005; Kervyn, Yzerbyt, & Judd, 2010; Richetin, Durante, Mari, Perugini, & Volpato, 2012; Vonk, 1994), it is unclear whether Asch's

¹ In the present research, in line with the recommendations by Fiske et al. (2007), warmth is used as an omnibus term that includes dimensions such as other-profitability (Peeters & Czapinski, 1990), morality (Wojciszke, 2005), trustworthiness (Todorov, Said, Engell, & Oosterhof, 2008), and social evaluation (Rosenberg, Nelson, & Vivekananthan, 1968).

original studies provide replicable evidence for the effect. Many studies suggest that warmth plays an important role in impression formation (for a review, see Fiske et al., 2007; Wojciszke, 2005), but we wonder if Asch has befittingly been cited as the progenitor of this effect. We believe that Asch's Gestalt theory, if anything, addresses the limitations and boundary conditions of primacy-of-warmth, and we wonder if his data provide any evidence for the effect itself. Before discussing the latter point, we first provide a short overview of Asch's main findings.

Overview of Asch (1946)

In the original publication (Asch, 1946), 10 studies were reported (total $N = 834$)² in which participants read different lists of traits. For example, in the classic warm-cold study (Study I), participants were either exposed to a trait-list containing *warm* or to a trait-list containing *cold*, keeping all other traits identical between groups. Participants then wrote down their impression of the target person (open-ended measure), selected which traits from a trait-pair list were most applicable to the target (trait-pair choice measure; see Appendix), and ranked the original traits according to importance for their impression (ranking measure). From this study, Asch concluded that participants treated warm and cold as relatively central in forming impressions, transforming their impressions when warm was replaced by cold. The subsequent nine studies featured variations to this paradigm, introducing other traits, manipulating the order of traits, asking participants to give synonyms for elements of the trait lists, or asking for judgments on how the provided traits are related. Table A1 of the Additional Findings provides a summary of all 10 studies.

Based on these experiments, Asch (1946) concluded that perceivers form coherent, unitary impressions of others. For such unitary impressions, perceivers attribute different meanings and weights to traits, assigning central roles to some traits (these determine the meaning/function of other traits) and peripheral roles to others (their meaning/function is determined by central traits). Traits interact dynamically in shaping each other's interpretation: Which traits become central or peripheral is fully determined by the trait context. Thus, *warm* was central in Asch's Study I when accompanied by traits like *intelligent*, *skillful*, *industrious*, *determined*, *practical*, and *cautious*, but was peripheral in Asch's Study IV when accompanied by traits like *obedient*, *weak*, *shallow*, *unambitious*, and *vain*. Asch suggests that changing the context does not merely lead to affective shifts (or Halo effects), but modifies the entire Gestalt of the impression and the cognitive content of the traits within this Gestalt. Or, as Asch puts it: "the gaiety of an intelligent man is no more or less than the gaiety of a stupid man: it is different in quality" (p. 287).

Interpretations of Asch's Work

Much like punch cards and slide carousels, the Gestalt-view on impression formation has slowly but surely gone out of fashion (partly because there were more simple explanations for Asch's 1946 data, e.g., Anderson, 1981; Rosenberg, Nelson, & Vivekananthan, 1968; Wishner, 1960), though some of its premises have resonated in typological models of impression formation (e.g., Anderson & Sedikides, 1991; Sedikides & Anderson, 1994). These typological models failed to gain a strong foothold in the field: Instead, dimensional models became increasingly popular. Dimensional models suggest that impressions of personality can be captured by a limited number of domains (such as warmth and competence; e.g., Fiske et al., 2007), and have given rise to an increase in research on the primacy-of-warmth effect.

Introductory textbooks presently put more emphasis on Asch's research (1946) as providing evidence for a primacy-of-warmth effect than on the Gestalt-model that was its actual focus. Many textbooks refer only to Study I, concluding that Asch's research shows that warmth is primary in impression formation³ (e.g., Baron & Byrne, 2004; DeLamater & Meyers, 2010; Franzoi, 2009; Hogg & Vaughan, 2011; Kassin, Fein, & Markus, 2011; Pennington, 2000; Stainton-Rogers, 2011; Taylor, Peplau, & Sears, 2006; Worchel, Cooper, Goethals, & Olson, 2000; for a notable exception, see Hewstone, Stroebe, & Jonas, 2007). Although Asch acknowledges that warmth plays an important role in impression formation, in his view, any trait can be central as well as peripheral. Thus, no trait is central by design, and even traits of special importance (such as *warm* and *cold*) may become peripheral in some contexts, as the meaning and weight of any trait is context-dependent. This ever-changing, context-dependent nature of centrality that is a key element of Gestalt-models seems to be at least somewhat at odds with the much more simple and parsimonious view that is portrayed by dimensional models, in which warmth is usually seen as central (and as primary over competence).

Evidence for Primacy-of-Warmth in Asch's (1946) Data

Asch's (1946) theorizing and the results of his Study IV do not support the primacy-of-warmth effect; the reason why he has been widely cited as the progenitor of this effect is because of his first study (Study I, or the classic warm-cold study). In our view, this study does not provide unequivocal evidence for primacy-of-warmth, as is apparent from the three measures Asch used in his research

² A well-informed reader may notice that Asch writes in his introduction that he tested over a 1,000 participants, but the results of only 834 are reported.

³ Although some authors additionally refer to Study VI or VII about primacy-effects.

(the open-ended, trait-pair choice, and ranking measures). We will now discuss each of these measures in turn.

In the open-ended measure, participants wrote down their general impression of the target. Asch (1946) based his conclusions to a large extent on these open-ended responses, providing many anecdotes, but never systematically analyzing the data. Consequently, the interpretation of these data was heavily contested by his contemporaries (e.g., Gollin, 1954; Luchins, 1948). Because replications of Asch's research did not include systematic analysis of open-ended responses either (e.g., Mensh & Wishner, 1947; Semin, 1989; Veness & Brierley, 1963), as yet it is unclear to what extent they provide evidence for primacy-of-warmth (or for effects that were the actual focus of Asch's paper; more information on those effects is available in our Additional Findings).

For the trait-pair choice measure, participants chose which trait (out of a pair) was most applicable to the target. The results suggest that changing a trait from positive (e.g., *warm*) to negative (e.g., *cold*) made the overall impression more negative (negative traits of the pairs were chosen more frequently). Though this effect has been replicated repeatedly (e.g., Mensh & Wishner, 1947; Veness & Brierley, 1963; Semin, 1989), it may not provide the most stringent test of the primacy-of-warmth hypothesis, as changing any positive trait into a negative one is likely to influence the overall valence of the trait-list.

For the ranking measure, participants ranked all traits from the stimulus list from most to least important to their impression. The results for this measure do not provide any evidence for a primacy-of-warmth effect: In Study I, warmth was ranked highest by 6 out of 42 participants, the exact amount that could be expected by chance (given that there are seven options). This limitation was acknowledged by Asch (1946), but seems to have been overlooked in many later references to his work. Unfortunately, the original data are reported incompletely, making it difficult to interpret which trait was primary in people's impressions (considering that it clearly was not warmth).

In sum, Asch's data (1946) do not provide clear evidence for a primacy-of-warmth effect. The open-ended responses that were important in Asch's theorizing were not systematically analyzed; the trait-pair choice measure seems unfit to test primacy-of-warmth; and the results of the ranking measure suggest that warmth was not central in determining participant's impressions. In addition, several factors make it difficult to estimate the extent of evidence for primacy-of-warmth in Asch's data: Several studies were insufficiently powered, the open-ended questions lacked a clear coding scheme, only incomplete accounts of the data were provided, and no quantitative statistical analyses were conducted.⁴ In the present research, we conducted a direct replication of Asch's Studies I, III, and IV (the studies that are most relevant to the primacy-of-warmth effect; see Table A1 of the Additional Findings

for an overview) to get more insight into the evidence Asch provides for a primacy-of-warmth in impression formation.

Method

Our replication attempt was highly similar to Asch's original work, but there are several methodological differences. First of all, we increased power and added statistical analyses of the ranking data and trait-pair choice data and systematic analyses of the open-ended responses, which were absent in the original publication. Second, we administered the study online through Amazon's MechanicalTurk (MTurk) instead of in a laboratory with student participants (the recent "Many Labs project" suggests that MTurk replications and laboratory replications yield highly similar results; Klein et al., 2014). Third, we randomly assigned participants to one of seven conditions to aid comparability of the studies (Asch ran the conditions in three separate studies). Fourth, the study proposal and materials were preregistered.

Participants and Design

Participants were recruited through MTurk in exchange for \$1. Of 1,140 participants, 117 were removed because English was not their native language or because they failed to pass an instructional manipulation check (Oppenheimer, Meyvis, & Davidenko, 2009). The remaining 1,023 participants⁵ (474 males) were on average 33 years old (range 18–75 years).

Participants were randomly assigned to one of seven trait lists (see Table 1). According to Asch (1946), *warm* and *cold* should be central in Conditions 1 and 2 when accompanied by traits like *intelligent*, *skillful*, *industrious*, *determined*, *practical*, and *cautious* (original Study I), but not in Conditions 3–5 when accompanied by traits like *obedient*, *weak*, *shallow*, *unambitious*, and *vain* (original Study IV). In Conditions 6 and 7 (original Study III), the same lists as in Conditions 1 and 2 were used with *warm* and *cold* replaced by *polite* and *blunt*. Asch included these lists to show that *polite* and *blunt* would be less central than *warm* and *cold*, suggesting that the centrality of a trait is determined by the interplay between that specific trait and the context.

Procedure

After providing informed consent, participants were instructed that they would see several traits on a computer screen, all of which belonged to the same person. Traits

⁴ Asch's research was published in 1946, when reporting statistical analyses was not yet customary (and many analyses still had to be invented).

⁵ Based on the literature by Cohen (1992) and power analysis with G*Power (Faul, Erdfelder, Lang, & Buchner, 2007), we had aimed to run 1,050 participants in total.

Table 1. Conditions included in our replication and the stimulus list participants were exposed to

Condition in Asch (1946)	Replication condition	Stimulus list
Study I, Group A	Condition 1	Intelligent, skillful, industrious, warm, determined, practical, cautious
Study I, Group B	Condition 2	Intelligent, skillful, industrious, cold, determined, practical, cautious
Study IV, Group A	Condition 3	Obedient, weak, shallow, warm, unambitious, vain
Study IV, Group B	Condition 4	Vain, shrewd, unscrupulous, warm, shallow, envious
Study IV, Group C	Condition 5	Intelligent, skillful, sincere, cold, conscientious, helpful, modest
Study III, Group A	Condition 6	Intelligent, skillful, industrious, polite, determined, practical, cautious
Study III, Group B	Condition 7	Intelligent, skillful, industrious, blunt, determined, practical, cautious

Table 2. Rankings of traits in Condition 1 (the warm-list), and average rank for each trait ($N = 159$)

Rank	Trait						
	Intelligent	Skillful	Industrious	Warm	Determined	Practical	Cautious
1	55.3%	1.9%	6.3%	19.5% (14%)	9.4%	5.0%	2.5%
2	23.9%	18.9%	5.7%	15.7% (35%)	17.6%	15.1%	3.1%
3	10.1%	28.9%	10.1%	17.0% (10%)	13.8%	15.1%	5.0%
4	5.0%	17.6%	17.0%	11.9% (10%)	19.5%	17.6%	11.3%
5	0.6%	18.9%	16.4%	11.3% (10%)	18.2%	20.8%	13.8%
6	3.1%	8.2%	24.5%	10.7% (7%)	14.5%	18.9%	20.1%
7	1.9%	5.7%	20.1%	13.8% (14%)	6.9%	7.5%	44.0%
AVG rank	1.89 ^a	3.80 ^b	4.86 ^d	3.67 ^b	3.91 ^{b,c}	4.21 ^c	5.67 ^e

Notes. Lower average ranks indicate that participants ranked the trait as more important in determining their impressions. Numbers in parentheses indicate the results reported in Asch's original study (1946; $N = 42$). Ranks not sharing the same superscript are significantly different from each other ($p < .05$).

were presented one by one for 3 s each, with 2 s between traits. Then, all traits were repeated once (cf. Asch, 1946). Next, participants were asked to type in their impression of the target person (open-ended measure). Subsequently, they were exposed to lists of trait pairs (see Appendix) and were asked to choose which trait from each pair was most in accordance with their target impression (trait-pair choice measure). Following that, all traits of the target were presented once again, and participants had to rank them in order of importance for their impression, starting with the most important trait (Rank 1) and proceeding to the least important one (Rank 6 or 7, depending on the condition; ranking measure). Finally, participants completed some demographic questions and were debriefed.

Results

Warmth in Rankings

To find out if *warm* and *cold* were more central than other traits within Conditions 1 and 2, we first investigated which traits were ranked as most influential in shaping perceivers' impressions (see Table 2). Only 19.5% of participants ranked *warm* as the most important trait in determining their impression, whereas 55.3% ranked *intelligent* as the most important trait. Wilcoxon signed rank tests confirmed

that *intelligent* received lower average ranks (indicating higher importance) than *warm*, $Z(2, N = 159) = -7.27$, $p < .001$, $r = 0.41$, with mean ranks of 1.89 and 3.67, respectively. Not warmth, but intelligence, was primary in shaping participants' impressions. In fact, the rank frequencies for warmth did not significantly differ from a flat distribution, $X^2(2, N = 159) = 7.11$, $p = .31$, suggesting that warmth did not receive higher (or lower) rankings than could be expected based on chance alone. In sum, the results of the ranking data do not provide evidence for a primacy-of-warmth effect: intelligence, not warmth, was the primary determinant of participant's impressions of personality.

In Condition 2, perceivers saw the same trait-list as in Condition 1, except for *warm* (which was replaced by *cold*). As apparent from Table 3, 30.0% of participants ranked *cold* as the most important trait in determining their impression, whereas 36.2% ranked *intelligent* as the most important trait. Wilcoxon signed rank tests confirmed that *intelligent* received lower average ranks than *cold*, $Z(2, N = 130) = -4.39$, $p < .001$, $r = 0.14$, with mean ranks of 2.34 and 3.77, respectively. Unlike for *warm*, the distribution of rank frequencies for *cold* did differ from a flat distribution, $X^2(2, N = 130) = 64.22$, $p < .001$, Cohen's $w = 0.70$. More specifically, *cold* was selected as most important trait by 30.0% of participants and as least important trait by 29.2% of participants: Participants seemed to have a polarized view on the importance of coldness, ranking it as important and as unimportant relatively frequently.

Table 3. Rankings of traits in Condition 2 (the cold-list), and average rank for each trait ($N = 130$)

Rank	Trait						
	Intelligent	Skillful	Industrious	Cold	Determined	Practical	Cautious
1	36.2%	5.4%	3.1%	30.0% (27%)	16.9%	6.2%	2.3%
2	30.8%	15.4%	13.8%	13.1% (21%)	16.9%	6.9%	3.1%
3	10.0%	23.8%	12.3%	10.0% (2%)	23.8%	10.0%	10.0%
4	14.6%	14.6%	13.8%	7.7% (5%)	18.5%	20.0%	10.8%
5	5.4%	23.1%	21.5%	4.6% (7%)	11.5%	17.7%	16.2%
6	0.8%	11.5%	16.2%	5.4% (5%)	10.0%	27.7%	28.5%
7	2.3%	6.2%	19.2%	29.2% (33%)	2.3%	11.5%	29.2%
AVG rank	2.34 ^a	3.94 ^c	4.62 ^d	3.77 ^c	3.30 ^b	4.65 ^d	5.38 ^e

Notes. Lower average ranks indicate that participants ranked the trait as more important in determining their impressions. Numbers in parentheses indicate the results reported in Asch's original study (1946; $N = 41$). Ranks not sharing the same superscript are significantly different from each other ($p < .05$).

Concurring with Condition 1, the results for the cold-list do not provide clear evidence for a primacy-of-warmth effect. *Intelligent*, not *cold*, seemed the primary determinant of participant's impressions of personality. However, given that *cold* received relatively polarized ranks, the results are not as unequivocal as they are for Condition 1.

Tables 4–8 contain the average ranks for all remaining experimental conditions. As in Conditions 1 and 2, *intelli-*

gent was rated as the most important trait in all conditions that included this trait (ranked highest by 53.5%–60.4% of participants), whereas *warm* and *cold* were not central in any condition that included one of these traits (ranked highest by 6.6%–7.8% of participants). Importantly, the centrality of *warm* and *cold* in Conditions 1 and 2 was even more absent in Conditions 3, 4, and 5, in accordance with Asch's hypothesis (1946) that the centrality of warmth

Table 4. Rankings of traits in Condition 3, and average rank for each trait ($N = 143$)

Rank	Trait					
	Obedient	Weak	Shallow	Warm	Unambitious	Vain
1	21.7%	25.2%	18.2%	7.0%	17.5%	10.5%
2	14.7%	19.6%	23.8%	7.0%	11.9%	23.1%
3	14.0%	17.5%	17.5%	9.8%	25.9%	15.4%
4	14.0%	21.0%	18.2%	12.6%	16.1%	18.2%
5	20.3%	11.2%	13.3%	25.2%	15.4%	14.7%
6	15.4%	5.6%	9.1%	38.5%	13.3%	18.2%
AVG rank	3.43 ^{b,c}	2.90 ^a	3.12 ^{a,b}	4.57 ^d	3.40 ^{b,c}	3.58 ^c

Notes. Lower average ranks indicate that participants ranked the trait as more important in determining their impressions. Ranks not sharing the same superscript are significantly different from each other ($p < .05$).

Table 5. Rankings of traits in Condition 4, and average rank for each trait ($N = 151$)

Rank	Trait					
	Vain	Shrewd	Unscrupulous	Warm	Shallow	Envious
1	44.0%	10.7%	18.7%	6.6%	16.0%	4.0%
2	16.7%	22.0%	17.3%	2.0%	27.3%	14.7%
3	18.0%	19.3%	15.3%	3.3%	23.3%	20.7%
4	15.3%	22.7%	14.0%	12.6%	16.0%	19.3%
5	3.3%	18.7%	24.0%	8.6%	11.3%	34.0%
6	2.7%	6.7%	10.7%	66.2%	6.0%	7.3%
AVG Rank	2.25 ^a	3.37 ^c	3.39 ^c	5.16 ^e	2.97 ^b	3.87 ^d

Notes. Lower average ranks indicate that participants ranked the trait as more important in determining their impressions. Ranks not sharing the same superscript are significantly different from each other ($p < .05$).

Table 6. Rankings of traits in Condition 5, and average rank for each trait ($N = 129$)

Rank	Trait						
	Intelligent	Skillful	Sincere	Cold	Conscientious	Helpful	Modest
1	53.5%	6.2%	17.8%	7.8%	7.0%	7.0%	0.8%
2	17.1%	21.7%	17.1%	10.1%	8.5%	17.1%	8.5%
3	7.8%	17.1%	11.6%	16.3%	15.5%	22.5%	9.3%
4	11.6%	11.6%	17.1%	6.2%	19.4%	22.5%	11.6%
5	6.2%	17.8%	20.9%	4.7%	17.8%	14.0%	18.6%
6	2.3%	19.4%	12.4%	8.5%	17.8%	10.9%	28.7%
7	1.6%	6.2%	3.1%	46.5%	14.0%	6.2%	22.5%
AVG rank	2.13 ^a	3.96 ^{b,c}	3.56 ^b	5.02 ^{d,e}	4.42 ^c	3.77 ^b	5.15 ^e

Notes. Lower average ranks indicate that participants ranked the trait as more important in determining their impressions. Ranks not sharing the same superscript are significantly different from each other ($p < .05$).

Table 7. Rankings of traits in Condition 6 (the polite-list), and average rank for each trait ($N = 159$)

Rank	Trait						
	Intelligent	Skillful	Industrious	Polite	Determined	Practical	Cautious
1	60.4%	5.0%	8.8%	10.7% (0%)	8.2%	3.1%	3.8%
2	17.6%	19.5%	10.1%	15.7% (0%)	23.9%	9.4%	3.8%
3	8.2%	27.0%	13.2%	15.7% (0%)	15.7%	13.2%	6.9%
4	6.3%	21.4%	13.8%	14.5% (10%)	19.5%	17.0%	7.5%
5	2.5%	12.6%	13.8%	13.2% (16%)	17.0%	25.8%	15.1%
6	3.1%	8.8%	17.0%	15.1% (21%)	8.8%	25.2%	22.0%
7	1.9%	5.7%	23.3%	15.1% (53%)	6.9%	6.3%	40.9%
AVG Rank	1.90 ^a	3.66 ^b	4.58 ^{c,d}	4.10 ^c	3.67 ^b	4.53 ^d	5.56 ^e

Notes. Lower average ranks indicate that participants ranked the trait as more important in determining their impressions. Numbers in parentheses indicate the results reported in Asch's original study (1946; $N = 19$). Ranks not sharing the same superscript are significantly different from each other ($p < .05$).

Table 8. Rankings of traits in Condition 7 (the blunt-list), and average rank for each trait ($N = 152$)

Rank	Trait						
	Intelligent	Skillful	Industrious	Blunt	Determined	Practical	Cautious
1	57.2%	6.6%	7.9%	5.9% (0%)	15.8%	5.9%	0.7%
2	19.7%	17.8%	17.1%	5.9% (15%)	23.7%	10.5%	5.3%
3	5.9%	24.3%	13.8%	12.5% (12%)	22.4%	15.1%	5.9%
4	4.6%	20.4%	16.4%	6.6% (19%)	20.4%	22.4%	9.2%
5	7.2%	13.8%	12.5%	9.9% (23%)	10.5%	26.3%	19.7%
6	2.6%	10.5%	20.4%	15.8% (4%)	5.3%	12.5%	32.9%
7	2.6%	6.6%	11.8%	43.4% (27%)	2.0%	7.2%	26.3%
AVG rank	2.03 ^a	3.75 ^c	4.17 ^d	5.30 ^e	3.10 ^b	4.19 ^d	5.46 ^e

Notes. Lower average ranks indicate that participants ranked the trait as more important in determining their impressions. Numbers in parentheses indicate the results reported in Asch's original study (1946; $N = 26$). Ranks not sharing the same superscript are significantly different from each other ($p < .05$).

is context-dependent. In fact, in these conditions, warmth and coldness received the lowest rank out of the entire trait lists, suggesting that they were the least important traits in determining participants' impressions.

Warmth in Open-Ended Descriptions

We further investigated the evidence for primacy-of-warmth in Conditions 1 and 2 by applying content analysis

to the open-ended responses. If the warm-cold dimension was at the heart of participants' impressions, *warm* and *cold* should be mentioned more often in their descriptions of the target person than any other trait from the presented lists. We thus simply counted the occurrence of all presented traits in participants' descriptions of the target person (plus close synonyms and common incorrect spellings, e.g., *intelligent* instead of *intelligent*). In Condition 1, *warm* and *intelligent* were mentioned about equally often, $F < 1$, with means of 0.23 and 0.22, respectively. Further, both were mentioned more frequently than any other trait (means between 0.01 and 0.11, all F s > 6.32 , all p s $< .05$, all η_p^2 s = .04–.06). Contrary to the predictions based on a primacy-of-warmth approach, participants were as likely to mention intelligence in their description of the target person as they were to mention warmth.

In Condition 2, *cold* versus *intelligent* were mentioned equally often, $F < 1$, with means of 0.27 and 0.24, respectively. All other traits were mentioned less frequently than both intelligence and coldness (the difference between *cold* and *determined* was only marginally significant; means between 0.01 and 0.15, all F s > 3.18 , all p s $< .08$, all η_p^2 s = .04–.05). Contrary to primacy-of-warmth, participants mentioned intelligence in their descriptions of the target person as much as coldness. These results are consistent with those for the ranking measure, in that neither provides evidence for a primacy-of-warmth effect in impression formation. Both measures suggest that warmth is not the primary determinant of perceivers' impressions, and that intelligence (a competence-related trait) seems at least equally important.

A possible disadvantage of the above analysis is that some warmth-related inferences may not have been part of the stimulus list: Instead of responding that the target person is warm, participants may have inferred the target to be trustworthy, helpful, or considerate. To pick up on these indirect warmth inferences, we generated an index of how warmth related the traits mentioned in the descriptions were. All traits mentioned by participants were rated by a separate group of participants ($N = 33$) on how warm and competent a person with that specific trait is (on a 7-point scale). To determine which words in participants' descriptions were traits, we used Anderson's list of personality traits (Anderson, 1968); only words included in this list were considered in the present analysis⁶. We generated a warmth index for 188 traits in this way: First, we calculated scores for warmth- and competence-relatedness by reverting the ratings to absolute values of the scores centered around the midpoint of the scale (e.g., the ratings one and seven would both be reverted to three, as both scores have a distance of three points to the midpoint of the scale). Next, we calculated the difference between competence-relatedness scores and warmth-relatedness scores, forming a warmth-index. Positive warmth-indices appear for traits that are more strongly related to warmth than to

competence. Contrary to predictions based on primacy-of-warmth, participants used traits more strongly related to competence in Condition 1, $t(136) = -3.81$, $p < .001$, with an average warmth-index of -0.33 , Cohen's $d = -0.32$. In Condition 2, the average warmth-index was not significantly different from zero, $t(103) = -0.68$, $p = .50$, $M = -0.08$, suggesting that the traits participants used were overall equally related to competence and warmth.

In sum, the descriptions participants provided about the target person contained many traits that were not part of the originally presented trait lists, suggesting that participants went beyond the information given and made inferences about the target person's other traits. However, even when taking the inferred traits into account (instead of limiting our search to the words *warm* and *cold*), we did not find evidence for primacy-of-warmth. Instead, the used traits were at least as strongly related to competence as they were related to warmth, suggesting that warmth was not at the heart of participants' descriptions of the target person.

Finally, to check whether our textual analysis may have missed subtle references to warmth, we asked an independent coder to rate for 350 (out of 1,023) randomly selected descriptions to what extent warmth or coldness was conveyed (more information is available in the Additional Findings). The descriptions of 54% of participants in Condition 1 and 36% in Condition 2 did not include any reference to warmth, showing that a substantial amount of participants did not refer to the warm-cold dimension, but solely focused on competence. As apparent from Table A3 in the Additional Findings, the function, meaning, and weight of warmth (if it was mentioned) differed strongly across conditions: For example, in some conditions, warmth was interpreted as meaning the person was truly nice and kind-hearted; in others, it was interpreted as a way for cold-hearted people to manipulate others. More information on the interpretation of warmth in different conditions is available in the Additional Findings.

In sum, the open-ended descriptions do not provide evidence for a primacy-of-warmth effect. Participants were not more likely to mention warmth in their descriptions of the target person than to mention intelligence; the traits they discussed in their descriptions were at least as strongly related to competence as they were to warmth; and a large part of participants did not make any references to warmth whatsoever.

Changes in Valence

One reason for Asch (1946) to conclude that warmth was central in impression formation was that the valence of impressions in his studies seemed to change dramatically when replacing *warm* by *cold* (as in Asch's original Study I), but not when replacing *polite* by *blunt* (as in Asch's original Study IV). To test this effect, which was not

⁶ Some participants did not use any trait words in their description of the target person that are part of the Anderson (1968) trait-list. These participants were excluded from this analysis.

quantified in Asch's original paper, we used textual analysis for assessing the valence of participants' descriptions of the target person in the open-ended responses.

After removing capitals and punctuation, we used a sentiment dictionary (Wilson, Wiebe, & Hoffmann, 2005) to establish the average valence of all descriptions. The dictionary we used contains the valence (positive, negative, or neutral) of 8,220 words in the English language. An average valence index for each description was determined by first counting the number of positive and negative words, and then subtracting the number of negative words from the number of positive words. In the resulting index, higher scores reflect more positive descriptions. As expected, descriptions were more positive for *warm*, M (Condition 1) = 3.24, than for *cold*, M (Condition 2) = 1.77, $F(1, 288) = 31.54$, $p < .001$. $\eta_p^2 = .10$. Changing *polite* to *blunt*, however, did not affect the valence of the impression ($F < 1$). In line with Asch's theorizing, changing *warm* to *cold* had a more pronounced influence on perceiver's impressions than changing *polite* to *blunt*. Thus, although the ranking measure and use of warmth-related terms in open-ended descriptions do not provide evidence for a strong version of the primacy-of-warmth effect, the warm-cold dimension nevertheless had a stronger influence on the overall valence of impressions than the polite-blunt dimension did.

Additional Analyses

The Additional Findings contain additional analyses that have no direct relevance to the primacy-of-warmth effect, but are related to Asch's hypotheses (1946) about the process underlying the above mentioned change in valence (pitting a change-in-meaning-effect, e.g., Hamilton & Zanna, 1974; Zanna & Hamilton, 1977, against a simple Halo-effect). They also contain analyses suggesting that almost all participants formed unified impressions in which they went beyond the information given, creating elaborate narratives about things that were not included in the original trait lists they had been exposed to (such as other traits, occupations, and gender). These exploratory analyses include modern-day data-analytical approaches to quantify some of the ideas that Asch had about his data, but was unable to test.

Discussion

In the present replication attempt, we aimed to critically examine the extent to which Asch's seminal "Forming impressions of personality" (1946) provides evidence for a primacy-of-warmth effect. Ample research suggests that warmth is often primary over competence in people's impressions of others (e.g., Fiske et al., 2007; Wojciszke, 2005), and Asch's classic warm-cold study often is one of the first and foremost references for this effect. In our replication of Asch's studies, we failed to find any evidence for

primacy-of-warmth. Even in those conditions in which primacy-of-warmth should have been most pronounced (the classic warm-cold studies), participants indicated that *intelligent* was at least as influential a trait in forming their impressions. Moreover, participants' descriptions of the target person centered on competence at least as much as on warmth, and a substantial amount of participants did not refer to warmth in their descriptions at all.

Although it may seem as if the present replication attempt proves Asch (1946) wrong, note that Asch never claimed that warmth should be primary over competence. Centrality, in his view, was a property multiple traits could possess simultaneously, a property determined by "the whole system of relations between traits" (p. 284). In fact, Asch was upfront about the fact that warmth, though important, was not primary in his studies: "That the rankings are not higher is due to the fact that the lists contained *other* central traits." (p. 7, emphasis added). The present research coincides with Asch's idea that the centrality of warmth is highly context-dependent. The warm-cold dimension played an important (though not primary) role in determining participant's impressions when accompanied by traits such as *intelligent*, *skillful*, *industrious*, *determined*, *practical*, and *cautious* (Condition 1), but it became entirely peripheral in the context of other traits (Conditions 3 through 5). In line with Asch's predictions, the weight and meaning of warmth was not fixed, being relatively important in some contexts but not others.

It could be argued that Asch's studies (1946) were not optimally designed to capture a primacy-of-warmth effect. For example, his stimulus lists contained unequal amounts of warmth- and competence-related traits and the ranking measure presupposes that perceivers can reliably indicate which traits influenced their impressions (which may not be the case; Nisbett & Wilson, 1977). Many methodological advances have been made in the 68 years since the publication of Asch's seminal paper, and there now seems to be converging evidence for the central role warmth plays in shaping impressions of personality (e.g., from face perception research, Todorov, Said, Engell, & Oosterhof, 2008; research on morality, Wojciszke, 2005; and research on the perception of persons and groups, Fiske et al., 2007). In light of these recent findings, it may seem unimportant that Asch's data do not provide evidence for primacy-of-warmth, because, after all, the effect seems present in more modern studies. Still, knowing about the lack of primacy-of-warmth in Asch's studies is important. With over 2,750 references, Asch's work has been "the stuff of textbooks" (Fiske et al., 2007, p. 78), forming part of the foundation on which this later research has been built. By focusing on an incomplete and incorrect interpretation of Asch's work, researchers forfeit the chance to learn from the subtleties and complexities of his ideas and the intricacies of his thinking, and run the risk of overestimating the evidence there is for the primacy-of-warmth effect.

Asch's data (1946) suggest that, in the context of certain traits, warmth may not always be primary over competence. What are these conditions? Is warmth generally primary over competence in forming impressions, or is this effect limited to very specific circumstances? The present

research suggests that Asch's data do not provide evidence for a primacy-of-warmth effect; if anything, competence seems more primary in his studies. Asch may not be the progenitor of primacy-of-warmth, but he did father the Gestalt-view on impression formation; A view that has lost its position at the forefront of science. For all its disadvantages, we believe this Gestalt-view (or other typological accounts of impression formation) may raise and answer questions that do not readily follow from dimensional models of impression formation. Asch's work, in our view, deserves a position at the forefront of science not because of its peripheral message about warmth, but because of its central message about the way in which people form impressions of personality, which constitutes the Gestalt of Asch's work.

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Appendix

Checklist (Trait-Pair Choice Measure) as Used in Asch (1946)

“Choose the characteristic that is most in accordance with the view you have formed.”

1. generous – ungenerous
 2. shrewd – wise
 3. unhappy – happy
 4. irritable – good natured
 5. humorous – humorless
 6. sociable – unsociable
 7. popular – unpopular
 8. unreliable – reliable
 9. important – insignificant
 10. ruthless – humane
 11. good looking – unattractive
 12. persistent – unstable
 13. frivolous – serious
 14. restrained – talkative
 15. self-centered – altruistic
 16. imaginative – hard headed
 17. strong – weak
 18. dishonest – honest
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