Think Leader—Think (Immoral, Power-Hungry) Man: An Expanded Framework for Understanding Stereotype Content and Leader-Gender Bias

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Abstract

Men's association with leadership is assumed to rest on stereotypes of men as more Agentic (strong, decisive, competent) and less Communal (helpful, kind, friendly) than women. Yet shortcomings in theory, measurement and analyses have obscured the nature of this bias. We use an expanded Power-Benevolence theoretical framework of stereotype content and a breakthrough analytical approach—three-mode principal component analysis, to map the basis for convergence and divergence in stereotypes of leaders with men, women and other groups. In two studies in the United States (Study 1: employed sample, N=365; Study 2: community sample, N=289), participants rated six groups on 64 traits. Across studies, there was a high overlap between men and leaders being stereotyped as more power-hungry, controlling, and domineering (“malevolent Power”) than women. Women were stereotyped as more competent than men and more compassionate and moral than both men and leaders. Thus, women's poorer leadership fit appears to rest on stereotypes that women lack malevolent Power rather than competence. These stereotypes were unrelated to participant gender or political orientation, but were stronger for people in lower management levels and in industries with more men in leadership. In addition to providing an innovative theoretical and analytical approach to examining stereotype content in general, our findings have important implications for understanding (gendered) lay beliefs about the nature of leadership and leaders.

Significance Statement

We examine a persistent cognitive bias contributing to inequality – why stereotypes of men and not women match stereotypes of leaders. Using a more expansive model of stereotyping than previous research, and a breakthrough analytical approach never applied in this field, we demonstrate that central to this bias is attributing leaders and men with malevolent forms of power (power-hungry, domineering) rather than more neutral forms of power attributed equally or more to women (intelligent, competent). This knowledge is critical for promoting equality: rather than challenging women's perceived lack of leadership capabilities (such as their competence), it may be more productive to challenge a culture that promotes a view of men and leaders as forcefully imposing one's will upon others.

Introduction

When we imagine leaders, we typically imagine men. Despite some progress made by women, men continue to dominate leadership roles including 92% of CEOs of the world's 500 largest corporations¹, as well as heads of governments, militaries, judiciaries, and religious institutions². Gendered stereotypes of leadership contribute to the persistence of this inequality³⁻⁷. Drawing on the social psychological model of two “fundamental” or “universal” dimensions of social judgement, referred to as Agency (or Competence or Dominance) and Commuality (or Communion or Warmth or Sociability or Morality)⁸⁻¹⁵ – prior research finds that men are rated as more Agentic (e.g., intelligent, decisive, strong, dominant) and women as more Communal (e.g., helpful, kind, friendly)¹⁶⁻¹⁹. As Agentic traits are linked to leaders whereas Communal traits are not^{3,16}, and because Agency is associated with high-status groups¹⁰, these stereotypes create a bias that favours men for leadership. That is, men are perceived as a better fit for leadership in being Agentic and non-Communal, while women are perceived as a poorer fit for leadership in being Communal and not very Agentic^{3,7} – a bias we call “think leader-think man”.

While the simplicity of existing two dimensional models of stereotype content are one of their strengths, based on shortcomings in theory, measurement and analysis, there is growing dissatisfaction with their limited ability to capture the ways in which groups may be viewed in terms of specific characteristics and traits^{8,20-24}. While this is a general problem, below we explain implications for understanding why stereotypes of leaders and men appear to overlap so substantially. To address these issues, we describe an expanded Power-Benevolence stereotype content framework, along with a breakthrough analytical approach that “maps” how individuals apply traits to groups, to identify for the first time: (1) the relevance

of a wide array of traits to stereotypes of leaders, men and women; and (2) the characteristics that best account for think leader-think man.

Prior Theory, Analysis, Method

Two dimensional Agency-Communality or Competence-Warmth models of stereotype content have informed a great deal of prior theory and research on gender, leader and other stereotypes.^{8-15,25} While various characteristics are used to index each dimension, one increasingly recognised limitation of existing two dimensional approaches is that in treating them as unitary “pure” dimensions, meaningful distinctions between the characteristics and specific traits that indicate them can be obscured. For instance, within Communality *morality* (trustworthy, honest, sincere) has been distinguished from *sociability* (likeable, warm, friendly), with *morality* more important for positive in-group evaluations^{22,26}. For Agency, *competence* (competent, capable, efficient) has been distinguished from *self-promotion* (ambitious, self-confident, assertive), with *self-promotion* but not *competence* attributed to high-status groups²⁷. Accordingly, while men are attributed some types of Agency more than women, unlike the past women are now stereotyped as having greater *competence* than men (e.g., intelligent, creative)^{19,22}.

Limitations arising from conceptualising Agency-Communality as unitary dimensions go beyond recognising nuanced facets of each dimension⁸, as such differences can be substantial and even competing. For example, Agency is a very ambiguous human quality that can range from benevolent (e.g., courageous, principled) to neutral (e.g., independent, confident) to malevolent (e.g., ruthless, aggressive) exercises of power¹⁸. It is also not difficult to imagine groups stereotyped with both high and low aspects of Agency, such as seeing students as intelligent (high Agency) but submissive (low Agency). Similarly, for Communality groups such as teenagers might be stereotyped as sociable (high Communality) but uncooperative (low Communality), or salespeople as outgoing (high Communality) but untrustworthy (low Communality). Stereotype theory, measurement, and analysis needs to be able to account for these patterns of stereotypes when they arise.

The potential for different and potentially competing patterns within Agency and Communality presents a problem for researchers pursuing “pure” measures of these dimensions. To do this, analyses such as factor analysis have been used, resulting in the exclusion of traits that index multiple dimensions or neither dimension^{10,28}. Negative traits have been a particular problem^{10,28}, with most measurement focusing instead on measuring positive traits^{10,11,29,30}. When negative traits are included, these have been antonyms assumed to be the opposing end of a single bipolar dimension (e.g., disorganised as low Agency; insensitive as low Communality)^{9,14}. One important downside of this approach for measuring gender and leader stereotypes is that it has led to the omission of highly Agentic negative traits (e.g., aggressive, domineering, ruthless). Negative Agentic traits can be expected to strongly characterize at least some types of leaders and men^{3,24,31-35}. Thus, excluding these types of traits from general measures of the two dimensions risks distorting understandings of stereotype content in general, and specifically in terms of what may best explain leader and gender stereotypes. Rather than excluding traits that fail to conform purely to a dimension, we need theory, measures, and analyses that can incorporate “non-pure” traits, as these traits might be some of the most powerful elements of group stereotypes.

The Present Approach

To extend beyond prior work, we offer alternative theory, analysis, and method to examine stereotype content in a way that should better explain the basis for think leader-think man.

Theory.

As a theoretical framework, we expand the Power-Benevolence stereotype content framework proposed by Leach and colleagues¹⁸. This model conceptualises the two dimensions of social judgement (Figure 1)

at a more global level than Agency-Communality or Competence-Warmth^{21,22}. Power (i.e., effectiveness) and Benevolence (i.e., social value) are latent, abstract dimensions around which characteristics (e.g., *strength*) and the more specific traits that cluster to indicate them (e.g., strong, decisive, influential) fall in a circumplex or circle¹⁸. Thus, characteristics and traits that cross-cut dimensions are a feature of the theoretical framework and are not treated as statistical “noise” as in other two dimensional models. Crucially, this allows the inclusion of malevolent forms of Power (high-Power low-Benevolence negative traits), such as being aggressive and power-hungry. The inclusion of these highly Agentic negative traits should enhance our understandings of stereotypes generally, and specifically for think leader-think man.

While Figure 1 may look similar to other two dimensional models, unlike other models the more abstract and latent conceptualization of Power and Benevolence means they are not unitary or static constructs within which all elements are theorized to fit equivalently. Instead, the relevance of different elements of these latent constructs, as well as relations between those elements, can vary markedly between groups (indicated by overlapping dashed circles to suggest non-exclusivity and movement). As examples, while elements of Power may sometimes align, such as groups that are both aggressive and competent (e.g., soldiers), some groups might be seen to express Power by being competent and not aggressive (e.g., scientists), some express Power by being aggressive without being competent or even because they are not competent (e.g., bullies). Rather than treat aggressive and competent as equivalent markers of the same dimension (which would fail to capture the distinct stereotypes of these groups), in this framework the theoretical focus shifts to identifying the aspects of Power and Benevolence that are associated with a group, and how different elements of the latent dimensions align or diverge. This theoretical framework better reflects how people actually apply stereotypes to groups (suggested by the examples above) than two static unitary dimensions that other models assume^{21,22}.

Figure 1. Two dimensional circumplex model of Power and Benevolence, with exemplar characteristics (labelled with underlined italics) and traits (in dashed circles) to indicate characteristics (adapted from Leach and colleagues²⁰).

Analysis.

A strong barrier to examining more expansive and contextualised approaches to stereotype content has been a lack of analytical tools. The most common analytical approaches used to examine stereotype content (factor analysis, multidimensional scaling) cannot simultaneously capture variation in how multiple *individuals* apply multiple *traits* to multiple *groups* (individuals, traits, and groups can each be called modes as they represent qualitatively different sources of variation)³⁶. Instead, these commonly used analyses require researchers to collapse across at least one mode, such as by using a single average score across a whole sample of individuals³⁷, using a single rating to represent multiple traits³⁸, or conducting analyses separately for each group rated¹⁰. This means many conclusions have relied on inferences rather than direct evidence (e.g., that a sample mean is an accurate representation of the views of all individuals in a sample, or that a complex set of traits can be represented by a single rating for all the groups being rated). These analytical requirements can also inadvertently contribute to distorted conclusions about stereotype content.

There is one little known and used approach that can simultaneously capture systematic variation across individuals, traits and groups in a way that allows us to identify more complex and contextualised stereotype content patterns: three-mode principal component analysis^{36,39,40} (3MPCA, see Supplementary Materials for more information about this analytical approach). By identifying a small number of components that capture the main patterns of systematic variation across individuals, traits and groups, 3MPCA allows us to take a step back to analyse some of the fundamental questions in stereotyping research that has previously not been possible. These include whether stereotypes are best represented using two dimensions (and the nature of those dimensions), whether individuals stereotype groups in similar ways, and even whether there are multiple patterns of stereotyping that vary between individuals.

Overview of Studies

We conducted two studies examining gender and leader stereotypes in the United States, as this is where most research on this topic has been conducted¹⁶. Study 1 used a gender-balanced sample of employed adults (N=365), and Study 2 used a representative community sample using quotas for age, gender, ethnicity, region, political affiliation, and employment status (N=289). Participants rated the three target groups (women, men, leaders), as well as three additional groups (students, teenagers, musicians [Study 1]/teachers [Study 2]) that served as reference groups (e.g., teenagers are likely to be seen as low on Power and teachers high on Benevolence). The reference groups also served as distractors to disguise the leader-gender focus of the research. Participants rated how characteristic 64 traits were of each group, with the traits drawn from an extensive review of the literature on stereotype content, gender stereotypes and/or leader stereotypes^{6,8,10,16,24,26,31,41-47}. To further disguise the research aims, each target group was rated in a separate survey, approximately 1 week apart, with each survey including one target group and one reference/distractor group.

Results

Main Analyses

As 3MPCA summarises the main patterns in a dataset, the number of patterns reflects a trade-off between parsimony and comprehensiveness as judged by the researchers and guided by statistical indicators. We compared the fit of all models from the simplest model where groups and traits are both represented on a single dimension common across all participants, summarised as a 1 (group component) × 1 (trait component) × 1 (participant component) model, to a complex 3 × 3 × 4 model where patterns relating

groups and traits are arranged in a cube-shaped space (3 orthogonal dimensions), with 4 cubes required to adequately represent systematic variation in participants' scores.

Based on indices of fit and the size of residuals relative to the number of components/degrees of freedom, the best model in both studies was represented by a 2 (components for groups) $\times$ 2 (components for traits) $\times$ 2 (components for participants), accounting for 33% of the variance in Study 1 and 28% in Study 2 (Supplementary Figures. S2 and S3). This means that patterns of associations between groups and traits (called a joint biplot) can be visualised in a two dimensional space, and two biplots are required to capture the main patterns of associations for participants (Figure 2 illustrates how to interpret associations between groups and traits in biplots; biplots for each study are shown in Figure 3 and 4).

Each participant also receives a participant component score that represents how well the pattern of associations between traits and groups fits their individual ratings. Participant component scores may be highly positive (the group $\times$ trait pattern fits their ratings well), close to zero (the group $\times$ trait pattern is unrelated to this participant's ratings) or highly negative (these participants show an opposite pattern, e.g., in Figure 2 they rated Competitive as least descriptive of men and Outgoing as most descriptive).

Figure 2. How to interpret group and trait associations in joint biplots. In this enhanced detail from Figure 3(b), associations for each trait with the group (Men) are shown by right-angled projections from the trait onto the axis represented by the group arrow (this extends beyond the arrow itself), with distance from the origin indicating the strength of association – either above average (shaded blue area, which we will call positive) or below average (unshaded area, negative). Of the traits shown, Competitive is the most strongly positively associated trait with Men, followed by Bold and Brave. Traits projecting to the origin (Individualistic) have an average rating for the group. Projections to the other side of the origin (illustrated here with a lighter dashed arrow in the opposite direction and unshaded) show the traits with below average ratings for the group. In this illustration Outgoing is the least associated trait with men. The locations and distances of traits relative to an arrow (e.g., Competitive is further away than Bold and on the opposite side to Brave) are determined by their associations with other groups rated.

The biplots in Figure 3 accounted for the largest proportion of the variance (29% in Study 1; 24% in Study 2), and represent a consensus view about stereotypes as almost all participants had positive participant component scores (i.e., 98% scored positively in Study 1, 95% scored positively in Study 2, and all negative scores were close to zero). The biplots in Figure 4 represent minor adjustments to this consensus view (accounting for an additional 4% of the variance in both studies), with about equal numbers of participants

having positive and negative participant component scores. For readers' convenience, in Figure 4 we show the patterns for those with positive and negative component scores on the second component separately (achieved by reversing the arrows for the groups).

Consensus view.

In Figure 3a (Study 1) and 3b (Study 2), groups are indicated by arrows/labels with different colours (green for leaders, gold for women, blue for men), with shading in that colour showing the traits with a positive (above average) association with that group and boldfaced coloured traits those with the strongest associations. Overlaps in shading shows where groups have traits in common (overlapping stereotypes). For the groups rated, stereotypes clearly reflected a Power dimension (vertical), which was somewhat negatively associated with a Benevolence dimension (traits higher in Benevolence tended to be lower in Power).

Stereotyping was highly similar across studies, so here we focus on the common patterns. There was a high degree of overlap in traits attributed to men and leaders (their arrows in a similar direction) – with high Power, *power-hungry*, traits (dominant, controlling, power-hungry) seen as most characteristic of both. Although not highlighted in the figures, the traits least attributed to leaders and men included low Power characteristics of *weakness* (timid, submissive, dependent), and of high Benevolence, including *compassion* (warm, compassionate, sympathetic), and *morality* (honest, sincere, ethical). In contrast to men and leaders, high Benevolence traits indicating *compassion* and *morality* were attributed most to women, while least attributed to women was being *power-hungry* (power-hungry, arrogant, aggressive). In short, what men and leaders shared most was being *power-hungry* and low on *compassion*, *weakness*, and *morality*. By contrast, women were viewed as low on *power-hungry*, but high on *compassion* and *morality*. Thus, think-leader-think man is based primarily on using power malevolently and lacking *weakness*, *compassion* and *morality*.

There was a small area of overlap between leaders and women (but not men) which related to *competence*. Thus, leaders were attributed some of the *competence* characteristics (competent, intelligent, skilful) attributed more to women, including skilful (Study 1 and 2) as well as competent (Study 1). Characteristics shared by men, women, and leaders were *independence* (self-reliant, self-sufficient, independent). In contrast, men were associated with incompetence (although it was a relatively weak association compared to other traits associated with men), which distinguished them from leaders and women in both studies.

Despite remarkable similarity across studies there were some minor but notable differences that may reflect the different composition of the samples (employed adults versus community sample). In Study 1 men were associated with more characteristics indexing *immorality* (unethical, dishonest) and *indifference* (not-concerned about others, selfish) than leaders were, whereas in Study 2 men and leaders were both associated with all traits indexing *immorality* and *indifference*. In Study 1, women were attributed some aspects of *weakness* (timid, submissive) and not *strength* (strong, decisive and influential), whereas in Study 2 women, like men and leaders, were associated with *strength* and not *weakness*.

For the reference/distractor groups, women shared the most overlap with musicians in Study 1 and teachers in Study 2. Women also shared some overlap with students (although more in Study 1 than Study 2) and teenagers: both were also low-Power, but unlike women, were most strongly characterized by *weakness* (submissive, dependent). In Study 1 (but not Study 2), students were like women in being associated with *compassion* and *morality*. Teenagers and students shared *sociability* with women and *immorality* with men in both studies. This illustrates how this analysis can identify where groups are stereotyped in ways that combine high and low characteristics on a dimension, in this case Benevolence.

Figure 3. Biplots for the first participant component in both studies, representing the consensus view for Study 1 (Panel (a)) and Study 2 (Panel (b)). Both biplots show a vertical dimension reflecting Power (with the strongest contrast between traits such as Powerful and Authoritative with Dependent, Timid and Submissive) and a diagonal dimension reflecting Benevolence (with the strongest contrast between traits such as Compassionate, Understanding and Sympathetic with Not concerned about others, Selfish and Arrogant). Traits such as Self-reliant are relatively high Power and around the mid-point/neutral for Benevolence. The off-diagonal line for Benevolence indicates that Power and Benevolence are not orthogonal for these groups. The extent to which each group is accounted for by the pattern of traits in each figure is represented by the length of the arrow for the group. *Note:* Achieving = Achievement-oriented, Motivated = Motivated to succeed, Risk-taking = Willing to take risks, Sympathetic = Sympathetic to others, Understanding = Understanding of others, Brave = Brave with decisions.

To understand who holds these stereotypes more strongly we correlated participant component scores with demographic and occupational variables (e.g., gender, age, education, Supplementary Table S7). In both studies we found these stereotypes were endorsed more strongly by people in lower levels of management and those working in industries with fewer female/more male leaders. These stereotypes were also endorsed more strongly by those with lower levels of education in Study 1 (but no association in Study 2). In Study 2, these stereotypes were stronger for older and White (vs. other ethnicities) participants (but this was not found in Study 1). Participant gender and political orientation (whether coded as Republican/Democrat or Liberal/Conservative) was not related to endorsement of these stereotypes in either study (Supplementary Table S9).

Study 2 included 13 measures to explore these associations further, including additional demographics, gender-relevant attitudes and prejudice (e.g., household income, traditional/egalitarian sex role beliefs, social dominance orientation, Supplementary Table S8). Notably, these stereotypes were not related to feminist identification, household income or benevolent sexism towards women. There were eight significant correlations, and focusing on the strongest correlations these stereotypes were endorsed more by people with more egalitarian/less traditional sex role beliefs, less reported experience of gender discrimination, lower social dominance orientation, and lower levels of hostile sexism towards women. Taken together, these associations suggest that the consensus model, in showing malevolent forms of Power, including *power-hungry*, rather than *competence*, characterizes men and leaders, is less likely to be endorsed by those with more sexist and dominating attitudes and by people in more powerful organisational roles.

Adjustment to the consensus.

Figure 4a-b (Study 1) and 4c-d (Study 2) capture a second systematic pattern of associations between traits and groups associated with the scores on the second participant component. Although technically these are two dimensional solutions, the vertical dimension accounted for a trivial <.001% of variance in both studies, meaning this pattern can be reduced to a single dimension. Unlike the first (consensus) participant component, participants were almost equally split between positive and negative component scores (Study 1: 49% positive; 51% negative; Study 2: 46% positive, 54% negative). While there is just one biplot in each study, to aid interpretation we present associations separately for positive and negative participant component scores with the only difference in reversing the direction of the arrows for groups and the associated shading (Study 1, Fig 4a-b; Study 2, Fig 4c-d).

In essence, Figure 4 reflects valence, with most negative traits on the left and most positive traits on the right. However, participants differed as to which groups were seen more positively or negatively. Those with positive scores on the second participant component (Figures 4a and 4c) saw women (and students and teenagers) more positively than leaders and men. Those with negative participant component scores saw men and leaders more positively than women.

Figure 4. Biplots for the second participant component in both studies, representing adjustments to the consensus view for Study 1 (Panels (a) & (b)) and Study 2 (Panels (c) & (d)). Traits are arranged so their initial capitalised letter shows their position on the dimension (e.g., in Study 1 the strongest associations were for Not concerned about others and Understanding; in Study 2 the strongest associations were for Selfish and Sympathetic). The extent to which each group is accounted for by the pattern of traits in each figure is represented by the length of the arrow for the group. *Note:* Achieving = Achievement-oriented, Motivated = Motivated to succeed, Risk-taking = Willing to take risks, Sympathetic to others = sympathetic, Understanding = Understanding of others, Brave = Brave with decisions

This second participant component represents an “adjustment” to the consensus view because it captures systematic patterns of divergence from the consensus stereotypes in Figure 3. This means that each individual's group $\times$ trait relations are a weighted combination of the two biplots, depending on their participant component scores on both components. For example, someone with a high positive score for both participant components stereotypes men and leaders as high on malevolent Power (*power-hungry*, lacking *weakness*, *compassion*, *morality*) and women as high on Benevolence (*compassion*, *morality*), and also views women relatively more positively than men. Those with scores close to zero on the consensus component and negative on the adjustment component have simpler stereotypes based on valence – viewing men and leaders uniformly more positively than women.

Scores on this second participant component were correlated with demographic/individual difference variables (for full details for all measures, Supplementary Table S8-S9; for correlations between measures, see Supplementary Table S5). In both studies women were seen more positively by political Liberals/Democrats, and thus men and leaders more positively by Conservatives/Republicans. Study 2 also showed associations with participant gender, with women having more positive views of women, and men having more positive views of men (gender in-group bias). Those in higher management roles were more likely to have more positive views of men and leaders than of women. For the Study 2 attitudinal measures, those higher on modern and hostile sexism and the more religious had more positive views of men and leaders and more negative views of women.

Discussion

Consistent results across two United States samples show a sinister side to think leader-think man: being *power-hungry* and lacking *weakness*, *compassion* and *morality* were central to understanding the greater overlap between stereotypes of men and leaders. Women were most clearly distinguished from men and leaders on *compassion* and *morality*. Overall, there was evidence that people do “think leader-think man” and that this is accounted for mainly by characteristics and traits indicating malevolent Power (that women lack), and in men and leaders lacking *weakness* and also Benevolence, including *compassion* and *morality* (that women strongly have). In short, “think leader-think immoral power-hungry man”.

Women, men, and leaders were consistently seen to share a narrow range of traits along the Power dimension relating to *independence* and to some degree *strength*. One area where women showed unique overlap with leaders was for *competence*. Women's small *competence* advantage over men converges with Eagly and colleagues findings on temporal changes in gender stereotypes¹⁹. It is also consistent with longer-term shifts in educational attainment, with more women than men obtaining baccalaureate degrees since the mid-1980s⁴⁸. However *competence* was only weakly and somewhat inconsistently associated with leaders. Thus, despite progress in women being seen as more competent, these gains have not clearly translated into a better perceived fit with leadership.

For the stereotypes of groups examined in this research, our analyses show that they are captured by two dimensions, but with some qualification by valence, where stereotypes of groups were split between having a relatively more positive or negative view. Yet the analyses also show a clear benefit of a more flexible understanding of how characteristics within two broader dimensions can be combined when describing different groups. The different groups were stereotyped in ways that showed only some aspects of Power or Benevolence, including combining characteristics theoretically low and high on the same dimension (e.g., teenagers, stereotyped as *immoral* and *sociable*). These findings underscore the need to move beyond approaches that aim to establish “pure” measures for each stereotype dimension, and the pitfalls of treating positive and negative traits as opposing ends of a bipolar scale. The partial view of stereotype content of prior approaches is particularly stark for stereotypes of men and leaders, as the highly Agentic negative traits that most characterised these groups are not incorporated in general measures.

That malevolent Power was most characteristic of stereotypes of men evokes the idea of “toxic masculinity” – a term frequently used in the media to account for men’s bad behaviour in leadership and beyond⁴⁹. It also supports claims that “hegemonic” masculinity (i.e., the dominant form) includes having power and control over others and opposing caring “feminine” qualities^{33-35,50}. To a lesser degree, more neutral forms of Power, including *self-promotion* (ambitious, assertive, confident) were also attributed to men and to leaders but not to women. In the context of men being stereotyped as more competent than women in the past¹⁹ we speculate that as women have come to be seen as having a small competence advantage over men, competence has also become less stereotypic of leaders⁵¹.

Some low-Power characteristics of *weakness* were also moderately attributed to women, reflecting an ongoing perception that they are subordinate to men. Stereotypes that women have *compassion* and *morality*, characteristics that both men and leaders are seen as lacking, have implications for deficit models of social change⁵² popularized by Facebook Chief Operating Officer Sheryl Sandberg’s bestselling book “Lean In”⁵³. Deficit models encourage women to adopt more masculine traits typical of leaders to get ahead. Based on our findings, this would primarily require women to aspire to malevolent Power that eschews both *morality* and *compassion*. As women may encounter a backlash for violating prescriptions of feminine niceness^{32,54} or for being immoral⁵⁵, such advice may undermine rather than help women’s career advancement.

While women exhibiting malevolent Power may receive greater social sanction than the same behaviour from men, women’s powerful behaviour does not always elicit dislike⁵⁶ and can be preferred over *weakness*⁵⁷. Empowerment campaigns have encouraged women to embrace “non-malevolent” forms of Power, including confidence and strength⁵⁸⁻⁶⁰. Such campaigns, along with women’s changing positions in society⁴⁸, could help explain why they were attributed *competence*, *independence* and to some degree *strength* (although none of these aspects of Power were seen as strongly characteristic of women). These distinctions further underscore the utility of the broader Power-Benevolence theoretical framework and an analytic approach that makes it possible to track change (or stagnation) in aspects of Power as shared or unique to women, men and leaders over time.

Contextual and ideological factors did impact how strongly the consensual leader-gender stereotypes were held, although not consistently with participant gender, age or political orientation. Instead, those receiving rather than making leadership decisions (lower management level); those in industries where men dominate leadership; and those committed to equality (lower sexism, social dominance orientation) were clearer in their views of men and leaders embodying malevolent Power and women embodying Benevolence. This suggests that having men as leaders and desiring gender equality heightens perceptions that men and leaders are characterized by malevolent Power. Thus, rather than a commitment to gender equality blurring boundaries between gender and leader stereotypes, it may provide the clearest view that there is an incongruity between women’s characteristics and those of leaders and men. As those desiring gender equality may also desire more Benevolent (especially *moral*) forms of leadership, promoting change in leadership to reduce its associations with malevolent Power, rather than targeting women to adopt the characteristics that most typify leaders (and men), may be a more effective and ethical change strategy.

While participant gender and political orientation were not related to the consensual leader-gender stereotypes, women and Liberals/Democrats held more positive stereotypes about women and more negative stereotypes about men and leaders than men and Conservatives/Republicans. This indicates that gender in-group bias and political ideology play only a minor role in individual’s stereotypes of leaders, men and women.

Our findings are relevant to the particular cultural and historical context of the United States. Data were collected during the Trump presidency but prior to the COVID-19 pandemic. While we did not specify particular leadership roles or domains, a country's prevailing political leadership may have some influence on leader stereotypes. Leader-gender stereotypes may be different in countries with populist versus non-populist leaders (for populist leaders, malevolent Power may be more stereotypic), and/or countries with women heads of state. In the latter case it is possible that leadership is viewed in more benevolent ways, particularly in relation to *competence* and therefore that the overlap with women would be greater.

Different leadership contexts are likely to be an important qualifier of men's strong association with leadership, with the overlap between stereotypes of leaders and women likely to be higher for certain leadership roles (e.g., in non-profit or female-dominated industries such as social care or education)^{3,16}. The expanded Power-Benevolence framework and 3MPCA provides opportunities to better understand the basis for such shifts, and also to examine the influence of gender defined in non-binary ways⁶¹ and how other structures of power, including ethnicity, class and the intersections of these group memberships⁶²⁻⁶⁶ alter perceived leadership fit. Intersectional research has uncovered differences in stereotypes of women and men with different ethnic and/or class backgrounds, including that Black women in the United States are stereotyped as confident and assertive in contrast to stereotypes of women as caring, soft and submissive⁶⁷. This raises the possibility that, at least in the United States, Black women share more overlap in traits associated with leaders than women from other ethnic groups (e.g., White, Asian).

In sum, our research examined an old question in a novel way that both resonates and markedly diverges from existing perspectives on why men are associated with leadership. Applying a more expansive and flexible Power-Benevolence theoretical framework and a transformative analytical approach that "maps" stereotype content, we found this association was best accounted for by malevolent forms of Power (*power-hungry*) not *competence*, and in lacking *weakness* and Benevolence (*compassion, morality*). To promote gender equality in leadership, challenging immoral bases of Power may be a better strategy, not only for increasing women's association with leadership, but also for promoting the type of leadership needed to address important social challenges.

Methods

Participants.

Study 1. Participants were recruited via Prolific, an online survey platform⁶⁸ to complete three 10-minute surveys, approximately seven days apart. We used screening criteria to achieve a gender-balanced sample of US resident, employed adults. We also followed Prolific's advice for longitudinal surveys, screening for participants who had completed a minimum of 10 previous submissions and had a minimum 95% approval rate on the platform. Participants were remunerated US\$1.75 for each survey and received a bonus payment (US\$0.85) for completing all three surveys. Our target sample was 300, but we initially recruited 400 participants to account for attrition and for participants who did not meet the inclusion criteria. Participant recruitment occurred October-November, 2018. Four-hundred and one participants started the survey at time 1 and after removing participants who made a mistake in how they had entered their Prolific identification (an alphanumeric string to anonymously identify participants), 380 participants completed all three surveys (95% completion rate). After applying our pre-registered inclusion criteria of a consistency check, suspicion check, demographic checks of being currently employed US residents fluent in English and not studying full-time, along with a pattern-responding check that we omitted in error from our pre-registered exclusion criteria, we obtained a final sample of 365. (See Supplementary Materials for full details of exclusions and Table S3 for demographics.)

Study 2. Participants were recruited by Dynata, a market research company, commonly used by social scientists and useful for recruiting hard-to-reach populations⁶⁹. We asked Dynata to balance the sample to be nationally representative on gender, age, ethnicity and region (based on census data), partisan affiliation (based on a recent Gallup poll) and employment status (based on Bureau of Labor Statistics annual averages for 2018). To reduce participant attrition, a rewards incentive was provided to participants who completed all three surveys, equivalent to US\$2.80 in panel points. Participant recruitment occurred July-September, 2019. Five-hundred and nine participants started the survey at time 1 and after removing participants with incomplete data or duplicate ID numbers, 310 participants completed all three surveys (61% completion rate). Comparison of the final sample to representative quotas are shown in Table S4 in Supplementary Materials. For gender, employment status, political party affiliation and state, quotas were largely met. Quotas for age and ethnicity were generally met, but there were fewer in the younger age categories, fewer Latinx and more Whites than expected. After applying our pre-registered inclusion criteria including a consistency check, suspicion check, demographic checks of being fluent in English and pattern-responding, along with a US resident check that we omitted in error from our pre-registered exclusion criteria, we obtained a final sample of 289. (See Supplementary Materials for full details of exclusions and Table S4 for demographics.)

Materials and procedure.

The surveys were conducted using Qualtrics survey software. At time 1, the first page contained background information about the research, followed by a page where participants provided informed consent by clicking several check boxes. Following this, participants entered basic demographic information. They were then provided with a cover story to reduce suspicion, informing them that the research was interested in understanding how people view the characteristics of many different kinds of people, with 9 example categories provided, including some they would be rating. We told participants that they would be randomly allocated to rate only some due to time constraints. When ready, they were asked to click “Allocate” to have the first of two groups that they would be rating for that session randomly generated.

Participants were randomly allocated to rate women or men as the first category at time 1, rating the alternative gender first at time 2. Leader was the first category rated at time 3. Following ratings of the target group at each time point, participants rated one other “reference/distractor” group. For Study 1, distractor groups were musicians (time 1), students (time 2) and teenagers (time 3). For Study 2, distractor groups were teenagers (time 1), students (time 2) and teachers (time 3). The full surveys can be found on the Open Science Framework site (Study 1: <https://osf.io/c2ps7/>; Study 2: <https://osf.io/6ery2/>). At time 3, category ratings were followed by additional demographic and other measures described below.

Traits. We selected sixty-four traits drawn from an extensive review of literatures relating to gender and/or leader stereotypes^{6,16,31,41-44,46,47} and the social-psychological literature on stereotype content^{8,10,11,20,26}. The broad spectrum of traits, included: competent, ambitious, dominant, power-hungry, competitive, creative, cooperative, ethical, trustworthy, compassionate (see Table S2 Supplementary Materials for the full trait list)

Demographics and additional measures. In Studies 1 and 2, a small number of demographics were measured prior to the ratings at time 1. In Study 1, these were: age in and years, US residence and years in US, English fluency, ethnic background, employment status, student status. In Study 2, additional demographic indicators were included at time 1 to use in screening representativeness, including: gender; age category, political party affiliation and residing state. Further demographics were collected at the end of time 3. In Study 1, these included: gender, highest education level, industry employed, estimates of percentage of women employees and senior leaders in industry employed, managerial status, liberal/conservative, and political party affiliation. In Study 2, we

included all these same measures at the end of the third survey (unless they had been asked at time 1) and the additional measures of religiosity, religious affiliation, household income, rural/urban location, perceived gender discrimination⁷⁰, feminist identification⁷¹, zero-sum perspectives on gender discrimination⁷², social-dominance orientation (short form)⁷³, traditional-egalitarian sex roles⁷⁴, modern sexism⁷⁵, ambivalent sexism inventory (short form)⁷⁶; ambivalence towards men inventory (short form)⁷⁶. (See Supplementary Materials for full details of all measures). Before completing these scales, people were asked to indicate what they thought the purpose of current research was (the suspicion check). At the end of the questionnaire, there was also a space for participants to make additional comments.

Analyses

Missing data. A 3MPCA requires a complete dataset, so missing data must be estimated or cases with missing data removed. In Study 1, 26 of 140,160 ratings (.02%) were missing, and in Study 2, 84 of 110,976 ratings (.08%) were missing. These values were replaced with the mean rating across target groups and participants for each trait (lateral slice means), but given the small amount of missing data analyses excluding these participants resulted in no identifiable differences in results.

Centring. As our focus was on associations between traits and groups, we used double-centring to remove overall mean differences for traits and groups (see Supplementary Materials for details). Its effect is that the 3MPCA is carried out on data representing the group $\times$ trait interaction, and individual differences between participants contained in their overall mean and the three-way interaction between traits, groups, and participants.

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Think Leader—Think (Immoral, Power-Hungry) Man: An Expanded Framework for Understanding Stereotype Content and Leader-Gender Bias

Supplementary Information

Preregistration information is available at <https://osf.io/34yp7/> (Study 1) and <https://osf.io/sd5hz/> (Study 2), where study materials are also available.

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1. Measures

Study 1 and 2

Traits and groups. We asked participants to rate each group using 64 traits. Before rating each group, we presented participants with the following instructions: “On the pages that follow are 64 characteristics. For each characteristic, please check one option to indicate to what degree you think [name of group] are like this, in general. We know that this is a generalization. But we all have overarching impressions of what different kinds of people are like. And that is what we are interested in here”. Responses options were: 0 (*Not at all*), 1 (*Very slightly*), 2 (*A little*), 3 (*Moderately*), 4 (*Quite a bit*), 5 (*Extremely*).

Table S1 includes the names used for the groups rated in each study and time point. Participants were randomly assigned to be Condition A or B, which determined whether they rated women or men at Time 1 or Time 2. After making ratings of women, men, or leaders, participants rated a distractor group.

Table S1. The order of presentation of groups in Study 1 and 2

Study 1	Time		
	1	2	3
Condition A	Women	Men	Leaders
	Musicians	Students	Teenagers
Condition B	Men	Women	Leaders
	Musicians	Students	Teenagers
Study 2	Time		
	1	2	3
Condition A	Women	Men	Leaders
	Teenagers	Students	Teachers
Condition B	Men	Women	Leaders
	Teenagers	Students	Teachers

We selected traits from an extensive review of the literature on stereotypes, including stereotypes relevant to gender and/or leaders. We grouped the 64 traits into 3 rating blocks to ensure there was a balance on each survey page in terms of the types of traits rated. Table S2 includes the full list of traits. We randomized the presentation order of each set of traits, and the presentation of traits within sets for each group.

Table S2. Traits used to rate groups.

Trait Set 1	Trait Set 2	Trait Set 3
Competent	Intelligent	Skilful
Un-ambitious	Ambitious	Achievement-oriented
Motivated to succeed	Incompetent	Brave with decisions
Courageous	Willing to take risks	Timid
Innovative	Submissive	Independent
Self-reliant	Dependent	Self-sufficient
Dominant	Forceful	Aggressive
Creative	Focused on control	Power-hungry
Domineering	Demanding	Arrogant
Humble	Strong	Powerful
Bold	Influential	Weak
Authoritative	Decisive	Confident
Assertive	Ruthless	Competitive
Selfish	Individualistic	Not concerned about others
Cooperative	Fair-minded	Principled
Ethical	Unethical	Moral
Trustworthy	Honest	Sincere
Dishonest	Sympathetic to others	Compassionate
Understanding of others	Unfeeling	Helpful
Generous	Sociable	Friendly
Outgoing	Reserved	Warm
Kind		

Age. Participants wrote their age (numerals, whole numbers) in both studies, and this was used for analyses. In Study 2 participants also chose their age category to facilitate cross-checking with survey company age quotas (Under 18, 18-24, 23-34, 35-44, 45-54, 55-64, 65-74, 75+).

Gender. In Study 1 participants selected one option from six: Female; Male; Trans Male/Trans Man; Trans Female/Trans Woman; Genderqueer/Non-Binary; and Not listed. In Study 2 participants selected from five options: Female; Male; Transgender; Non-binary; Not listed.

US residency. Participants indicated whether they were currently living in the USA (Yes, No), and wrote how many years of their life they had lived in the USA (numerals, whole numbers).

English fluency. Participants indicated if they were fluent in English (Yes, No).

Ethnic background. In Study 1 participants selected their ethnic background from eight options: Hispanic/Latina/Latino; White American/European American; Black/African American; Native American/Alaska Native; Middle Eastern American; Asian American; Mixed/Multiple; Not Listed (please specify). In Study 2 we added Native Hawaiian and other Pacific Islander, and replaced “Not listed” with “Another ethnic group”.

Education. Participants indicated whether they were a student (Yes - full-time, Yes part-time, No). They also selected the highest level of education they had completed (Less than high school, High school, Some college but no degree, Associate degree in college (2-year), Bachelor’s degree in college (4-year), Master’s degree, Doctoral degree, Professional degree (JD, MD)).

Employment status. Participants indicated their *current employment status* by selecting from the following categories: Full-time paid employment; Part-time paid employment; Casual paid employment (Study 1 only); Unemployed (and job seeking); Not in paid employment (e.g., homemaker, retired, or due to a disability); Other (please specify). They also selected the *industry in which they were employed* from 19 options, e.g., mining, retail trade, manufacturing. They also selected their *managerial status* from the following five options: Upper management; Middle management; Junior management; Non-managerial; Not applicable (Study 2).

Political orientation. Participants rated their political orientation in response to this question: “In political matters, people sometimes talk about “liberals” and “conservatives.” How would you place your views on this scale, generally speaking? Options were 1 (*Very liberal*), 2 (*Liberal*), 3 (*Slightly liberal*), 4 (*Moderate/middle of the road*), 5 (*Slightly conservative*), 6 (*Conservative*), 7 (*Very conservative*). They also selected their political party affiliation (Republican, Democrat, Independent, Other, No Preference).

Women in industry. Participants estimated the *percentage of women employees in their industry* (sliding scale, 0-100%); and the *percentage of senior leaders in their industry who were women* (sliding scale, 0-100%).

Study 2 only

In Study 2 we included additional sociodemographic measures, as well as general and gender-specific attitude measures to examine relationships with endorsement of the stereotype models.

Religiosity. Participant's religiosity was measured with the item: "How religious are you, if at all?" rated from 1 (*Not at all religious*) to 7 (*Very religious*). We also asked their religious denomination: Buddhism, Christianity (Protestant), Christianity (Catholic), Hindu, Islam (Shia), Islam (Sunni), Judaism, Agnostic, Atheist, Do not belong to a religion but not atheist or agnostic, Other (please specify).

Socioeconomic status. Participants read the following text: "A median household income is the income level where 50% of households earn less and 50% of households earn more. The median annual income for households in the United States nowadays is about \$58,000. Considering all the sources of income of members of your household, is your household" Response options were: Very much below the median; Below the median; A little below the median; About the median; A little above the median; Above the median; Very much above the median.

Rural/urban residence. We also asked participants to indicate whether they live in a more urban/city area, or a more rural/country area. Responses ranged from 1 (*Very Rural/Country*) to 5 (*Very Urban/City*).

Social Dominance Orientation. We used the SDO-7¹ to measure Social Dominance Orientation. We included this to measure participants' general (i.e., non-gender specific) endorsement of group dominance/equality. The measure includes 4 pro-trait dominance items (2 reverse scored), for example: "An ideal society requires some groups to be on top and others to be on the bottom", "No one group should dominate in society" (reverse scored); and 4 pro-trait anti-egalitarianism items (2 reverse scored), for example: "Group equality should not be our primary goal", "We should do what we can to equalize conditions for different groups" (reverse scored). Responses include: 1 (*Strongly Oppose*), 2 (*Somewhat Oppose*), 3 (*Slightly Oppose*), 4 (*Neutral*), 5 (*Slightly favor*), 6 (*Slightly favor*), 7 (*Strongly favor*). After reverse coding we used the mean score of all 8 items ($\alpha = .84$), with higher scores indicating stronger social dominance orientation.

Traditional-Egalitarian Sex Roles. To examine attitudes towards gender roles in society, including that men should be more focused on their careers, make better leaders, and should be the financial provider for the family, whilst women should be in caring roles and more concerned with physical appearance, we adapted items from the Traditional-Egalitarian Sex Roles scale². Six items measured traditional values (reverse scored) including: "Women should be more concerned with clothing and appearance than men", "The man should be more responsible for the economic support of the family than the woman", "In groups that have both male and female members, it is more appropriate that leadership positions be held by males", "I would not allow my son to play with dolls", "Men make better leaders", "The role of teaching in the elementary schools belongs to women". Six items measured egalitarian values, including: "It is just as important to educate

daughters as it is to educate sons”, “Women should have as much sexual freedom as men”, “It is a myth that women cannot make as good supervisors or executives as men”, “Having a job is just as important for a wife as it is for her husband”, “Having a challenging job or career is as important as being a wife and mother”, “A man who has chosen to stay at home and be a house-husband is not less masculine”. Response options included 1 (*Strongly Disagree*), 2 (*Somewhat Disagree*), 3 (*Neutral*), 4 (*Somewhat Agree*), 5 (*Strongly Agree*). An exploratory factor analysis clearly suggested a single factor. After reversing traditional items, we averaged responses across all items to create a composite score ($\alpha = .84$), with higher scores indicating more egalitarian sex-role beliefs.

Modern Sexism. We used the Modern Sexism scale³ to assess modern sexism, which refers to denying ongoing gender inequality in society. There were 8 items (3 reverse scored), for example: “Discrimination against women is no longer a problem in the United States”. Response options ranged from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). After reverse scoring appropriate items, we averaged responses to create a composite score ($\alpha = .86$) in which a higher score indicates greater modern sexism.

Ambivalent Sexism Inventory. We used the short version of the Ambivalent Sexism Inventory⁴. Six items measured Hostile Sexism, defined as negative attitudes towards women perceived to challenge male power (e.g., “Women seek to gain power by getting control over men”). Six items measured Benevolent Sexism, relating to idealized views of women as pure but in need of men’s protection (e.g., “Many women have a quality of purity that few men possess”). Response options were 0 = (*Disagree Strongly*), 1 (*Disagree Somewhat*), 2 (*Slightly Disagree*), 3 (*Agree Slightly*), 4 (*Agree Somewhat*), 5 (*Agree Strongly*). We averaged responses for each construct, creating composite scores whereby higher scores indicate greater hostile sexism ($\alpha = .87$) and greater benevolent sexism ($\alpha = .80$).

Ambivalence towards Men Inventory. To examine how attitudes towards men may be related to people’s endorsement of the stereotype models, we used a short version of the Ambivalence towards Men Inventory⁴. This includes 6 items measuring hostility towards men, including about men’s dominance, superiority, and control over women (e.g., “When men act to “help” women, they are often trying to prove they are better than women”). Six items measured benevolence towards men, encompassing positive attitudes towards men based on their provider roles and dependence on women for care (e.g., “Even if both members of a couple work, the woman ought to be more attentive to taking care of her man at home”). Response options were 0 = (*Disagree Strongly*), 1 (*Disagree Somewhat*), 2 (*Slightly Disagree*), 3 (*Agree Slightly*), 4 (*Agree Somewhat*), 5 (*Agree Strongly*). We averaged responses for each construct, creating composite scores whereby higher scores indicate greater hostility towards men ($\alpha = .77$) and greater benevolence towards men ($\alpha = .83$).

Feminist identification. We used a one-item measure⁵: “Do you identify as a feminist?”; response options ranged from 1 (*Definitely Not*), to 7 (*Yes, Definitely*) with a labelled midpoint 4 (*Neutral/Not Sure*).

Gender discrimination experience. We measured experience of gender discrimination in the past year using one item⁶: “In the past year, how often have you felt that you were

being discriminated against because of your gender”, responses ranged from 1 (*Never*) to 5 (*Very Often*).

Zero-sum perspectives on gender status. We used a one-item measure ⁷: “Please indicate the extent to which you believe declines in discrimination against women are directly related to increased discrimination against men”; responses ranged from 1 (*Not at all*) to 10 (*Very much*).

2. Exclusions

Exclusions overview

We implemented exclusion criteria as per our pre-registrations for each study, except for two criteria omitted from pre-registrations in error (one in Study 1 and one in Study 2 as specified below).

Additionally, we did not apply one pre-registered exclusion criterion relating to missing data for both studies. We specified in both of our pre-registrations that participants who did not provide complete data would be excluded. This was because our key analyses requires a full dataset, and we were concerned that making repeated ratings may lead to people choosing to skip items or sections, resulting in a substantial amount of missing data needing to be substituted, which would potentially influence analyses. However, after applying other exclusions the amount of missing data was miniscule (Study 1: 26 of 140,160 ratings; Study 2: 84 of 110,976 ratings), so we decided to substitute these missing data rather than delete the almost complete data provided by these participants.

Study 1 exclusions

We excluded a total of 15 participants based on the criteria below.

Consistency check: We excluded two participants because they showed inconsistent responding for all three trait pairs (competent/incompetent; honest/dishonest; dominant submissive) by answering either ‘0’ and/or ‘1’; or ‘4’ and/or ‘5’ for both items within each pair (e.g., rating “5” for both competent and incompetent for the same group, indicating that they thought the group was both extremely competent and extremely incompetent). One participant made these inconsistent ratings for the men category, and the other was for the women category.

Suspicion check: No participants correctly guessed the aim of the study so no exclusions were made.

Demographics: We applied demographic exclusion criteria based on participants’ responses in the survey. We specified all these demographic exclusions in our pre-registration.

Not in paid employment. We excluded five participants as they were not currently in paid employment (3 unemployed and job seeking, 2 not in paid employment)

US residency. All participants selected Yes to whether they lived in the US.

English fluency. No participants indicated that they were not fluent in English.

Full-time students. We excluded a further four participants because they reported being full-time students.

Pattern responding (*not pre-registered*). We excluded a further four participants for pattern responding, where they selected the same rating for all responses when rating at least one of the key groups (women, men, or leaders). This is a clear and common indicator of non-attentive responding, but we omitted this in error from the pre-registration (but included it in the pre-registration for Study 2). Applying this exclusion for Study 1 provided greater consistency in exclusion criteria used across studies.

Study 2 exclusions

We excluded twenty-one participants based on the criteria below.

Consistency check: We excluded twelve participants because they showed inconsistent responding for all three trait pairs (competent/incompetent; honest/dishonest; dominant submissive) by answering either '0' and/or '1'; or '4' and/or '5' for both items within each pair, for at least one of their ratings of men (5 participants), women (5 participants) or leaders (4 participants).

Suspicion check: No participants correctly guessed the aim of the study so no exclusions were made.

Demographics: For Study 2, we instructed Dynata to set quotas to obtain a nationally representative sample on gender, age, ethnicity and region, partisan affiliation, and employment status. We report information about quotas in Table 2. We excluded based on self-reported English fluency, but unlike Study 1 we did not pre-register employment/student exclusion criteria because we wanted a community sample (rather than Study 1's working sample). However, we added one non-pre-registered exclusion criterion for closer correspondence with Study 1.

English fluency. No participants indicated that they were not fluent in English.

US residency (*not pre-registered*). We omitted US residency as an inclusion criteria in the pre-registration in error. One participant had missing data for the question of currently living in the US. However we did not exclude them because they responded "55" to the question of years living in the US.

Pattern responding: We excluded a further nine participants for pattern responding, whereby they entered the same value for all responses in at least one of the rating sets for women, men, or leaders.

3. Demographics and correlations

Recoding

In Study 2, participants entered responses for demographic questions for age and years living in the USA into a text box, and some data entry errors were observed. Where these were unambiguous we recoded the data as follows:

Age: Two participants entered a year (i.e., 1996, 1985) instead of their age. It seemed clear this was a reference to their year of birth, so we converted these responses to 23 and 34 (the study was conducted in 2019). One participant wrote 3, which was coded as a missing value.

Years living in the USA: One participant wrote 1995, and as their age was 23 we changed their value to 23.

Demographic information

Demographic information is shown in Table S1 for Study 1, and Table S2 for Study 2.

Table S3. Demographics for Study 1

Gender	Age	Years in US	Ethnicity %		Education %	Employment Status %
Women = 183	<i>M</i> = 35.90	<i>M</i> = 34.08	Native American/Alaska Native - .3		High School Graduate - 8.5	Full-time paid employment -
Men = 181	<i>SD</i> = 9.91	<i>SD</i> = 11.09	Asian American - 6.8		Some College - 15.9	74.8
Non-binary = 1	Range =	Range	Black/African American - 5.2		Associate Degree - 11	Part-time paid employment -
	18-68	= 3-68	White American/European American - 75.6		Bachelor's Degree - 44.9	19.2
			Middle Eastern American - .8		Master's Degree - 16.4	Casual paid employment – 3.3
			Hispanic/Latina/Latino American - 5.8		Doctoral Degree - .8	Other – 2.7 (all self-employed)
			Mixed/multiple ethnic groups - 5.5		Professional Degree - 2.5	
Managerial Status %	% Women Employees	% Women Senior Leaders	Industry Employed %		Political Party Affiliation %	Political Orientation %
Upper management - 7.4	<i>M</i> = 46.76	<i>M</i> = 30.74	Forestry, fishing, hunting or agriculture support - .3 Real estate or rental and leasing - 1.4 Mining - .3 Professional, scientific or technical services - 15.3 Utilities - 2.2 Management of companies or enterprises - 2.5 Construction - 3.6 Manufacturing - 4.4 Educational services - 8.8	Wholesale trade - .3	Democrat - 54.5	Very Liberal - 17
	<i>SD</i> = 20.72	<i>SD</i> = 22.22		Health care or social assistance - 9.9	Independent - 22.2	Liberal - 28.8
Middle management - 19.5				Retail trade - 9.3	Republican - 15.1	Slightly Liberal - 14
				Arts, entertainment or recreation - 7.9	Other - 3.8	Moderate/Middle of the Road - 18.1
Junior management - 15.9				Transportation or warehousing - 1.1	No preference - 4.4	Slightly Conservative - 10.4
				Accommodation or food services – 3.6		Conservative - 8.8
Non-managerial - 57.3				Information – 10.1		Very Conservative - 3
				Finance or insurance - 7.1		
				None of the above - 12.1		

Table S4. Demographics for Study 2 and representative quotas

Gender % Obtained (Quota)	Age	Years in US	Ethnicity % Obtained (Quota)	Education %	Employment Status % Obtained (Quota)
Women = 51.6 (50)	<i>M</i> = 51.42	<i>M</i> = 48.63	Native American/Alaska Native - .7 (.7)	Less than High School – 2.8	Full-time paid employment - 48.1 (50)
Men = 47.4 (49)	<i>SD</i> = 16.78	<i>SD</i> = 18.45	Asian American - 6.2 (4.7)	High School Graduate – 14.5	Part-time paid employment - 9.7 (11)
Non-binary = 1.04	Range =	Range	Black/African American - 11.1 (12.2)	Some College - 18.3	Unemployed (and job seeking) 3.8 (2.5)
	19-88	= 1-87	White American/European American - 72.7 (63.7)	Associate Degree – 9.3	Not in paid employment (e.g., homemaker, retired or due to a disability) – 36.7 (37)
			Middle Eastern American - .3	Bachelor's Degree - 30.4	Other – 1.4
			Hispanic/Latina/Latino American - 7.6 (16.3)	Master's Degree - 20.4	
			Mixed/multiple ethnic groups - 1.4 (1.9)	Doctoral Degree - 2.1	
			Some other Race alone - 0 (.3)	Professional Degree - 2.1	
			Native Hawaiian and Other Pacific Islander - 0 (.2)		
Managerial Status (%)	% Women Employees	% Women Senior Leaders	Industry Employed %	Political Party Affiliation % Obtained (Quota)	Political Orientation %
Upper management - 15.9	<i>M</i> = 51.83	<i>M</i> = 38.12	Forestry, fishing, hunting or agriculture support - .7	Democrat - 29.8 (31)	Very Liberal – 9.3
	<i>SD</i> = 20.64	<i>SD</i> = 23.52	Real estate or rental and leasing - .7	Independent – 36 (38)	Liberal – 8.7
Middle management - 20.1			Mining - .3	Republican - 31.8 (30)	Slightly Liberal – 8.3
			Professional, scientific or technical services - 7.3	Other - 1.0	Moderate/Middle of the Road - 33.2
Junior management - 9.3			Utilities - 1.4	No preference - 1.4	Slightly Conservative - 14.9
			Management of companies or		Conservative - 18.0
Non-managerial - 33.2			enterprises - 2.1		Very Conservative – 7.6
			Construction - 1.7		
Not-applicable – 21.5			Manufacturing - 7.6		
			Educational services – 9.3		
				Finance or insurance - 4.8	
				None of the above - 38.1	

Table S4 (cont). Demographics for Study 2 and representative quotas

Age category % Obtained (Quota)	Rural/ Urban	Student status %	State % Obtained (Quota)	Religiosity Religious affiliation %	Median household income \$US58,000 %
18-24 = 7.3 (13)	<i>M</i> = 3.27 <i>SD</i> = 1.06	Full-time - 7.3	Alabama - 3.5 (2)	<i>M</i> = 4.11	Very much below the median - 8.3
25-34 = 12.5 (18)		Part-time - 2.8	Alaska - 0.7 (0)	<i>SD</i> = 2.14	Below the median - 9.0
35-44 = 15.9 (18)		Non student - 90	Arizona - 2.8 (2)	Buddhism - 2.1	A little below the median - 11.8
45-54 = 18.7 (19)			Arkansas - 0 (1)	Protestant - 37.7	About the median - 17.0
55-64 = 19.0 (16)			California - 8.7 (12)	Catholic - 23.9	A little above the median - 17.3
65-74 = 19.0 (17)			Colorado - 1.4 (2)	Hindu - 1.0	Above the median - 27.0
75+ = 7.6			Connecticut - 1.0 (1)	Judaism - 3.8	Very much above the median - 9.7
			Delaware - 0 (0)	Other - 5.5	
			District of Columbia - 0.7 (0)	Agnostic - 6.6	
			Florida - 9.3 (6)	Atheist - 6.9	
			Georgia - 5.2 (3)	Do not belong to a religion and not atheist or agnostic - 12.5	
			Hawaii - .7 (0)		
			Idaho - 0 (0)		
			Illinois - 3.5 (4)		
			Indiana - 2.8 (2)		
			Iowa - 1.7 (1)		
			Kansas 0 (1)		
			Kentucky - 1.0 (1)		
			Louisiana - 1.0 (1)		
			Maine - .7 (0)		
			Maryland - 0 (2)		
			Massachusetts - 3.5 (2)		
			Michigan - 3.1 (3)		
			Minnesota - 1.4 (2)		
			Mississippi - .3 (1)		
			Missouri - 3.1 (2)		
			Montana - 0 (0)		
			Nebraska - 0 (1)		
			Nevada - 1.0 (1)		
			New Hampshire - 0 (0)		
			New Jersey - 4.5 (3)		
			New Mexico - 0 (1)		
			New York - 5.9 (6)		
			North Carolina - 2.4 (3)		
			North Dakota - .3 (0)		
			Ohio - 4.2 (4)		
			Oklahoma - 1.7 (1)		
			Oregon - .7 (1)		
			Pennsylvania - 5.5 (4)		
			South Carolina - 2.1 (2)		
			South Dakota - 0 (0)		
			Tennessee - 2.1 (2)		
			Texas - 6.2 (8)		
			Utah - .7 (1)		
			Vermont - 0 (0)		
			Virginia - 1.7 (3)		
			Washington - 2.4 (2)		
			West Virginia - 0 (1)		
			Wisconsin - 2.4 (2)		
			Wyoming - 0 (0)		

Table S5. Study 2 Means (SDs) and Correlations for Women (bottom left) and Men (top right) for General and Gender-Specific Attitudes and Demographics

	Women	Men	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Social Dominance Orientation	2.88 (1.16)	3.26 (1.14)	–	-.55**	.59**	.50**	.48**	.25**	.48**	.29**	-.32**	.09	.23**	.07	.02	.08
2. Traditional-Egalitarian Sex Roles	3.93 (.73)	3.73 (.65)	-.67**	–	-.55**	-.62**	-.64**	-.32**	-.38**	-.45**	.31**	-.24**	-.28**	-.18*	.06	-.14
3. Modern sexism	2.47 (.82)	2.74 (.83)	.63**	-.58**	–	.57**	.51**	.32**	.62**	.32**	-.38**	-.17	.27**	-.10	.15	.09
4. ASI—Hostile	1.84 (1.29)	2.36 (1.03)	.61**	-.69**	.66**	–	.62**	.32**	.51**	.50**	-.39**	.30**	.25**	.05	.00	.04
5. AMI—Benevolence	2.05 (1.22)	2.23 (1.03)	.58**	-.71**	.53**	.71**	–	.77**	.33**	.35**	-.25**	.37**	.27**	.12	.03	.19*
6. ASI--Benevolent	2.40 (1.18)	2.66 (.10)	.44**	-.55**	.33**	.58**	.61**	–	.31**	.35**	-.19*	.37**	.32**	.13	.08	.12
7. Political Orientation	3.93 (1.70)	4.47 (1.61)	.43**	-.31**	.48**	.35**	.34**	.34**	–	.22**	-.35**	-.00	.41**	-.23**	.29**	-.07
8. Zero-sum perspective	4.52 (2.59)	4.52 (2.63)	.34**	-.37*	.39**	.48**	.31**	.22*	.17*	–	-.22**	.04	.30**	.06	-.16	-.03
9. Feminist identification	3.48 (2.14)	2.43 (1.81)	-.44**	.41**	-.51**	-.48**	-.35**	-.26**	-.49**	-.25**	–	-.06	-.28**	.07	-.09	-.12
10. AMI—Hostility	2.61 (1.05)	2.16 (.92)	.14	-.13	-.11	.23**	.38**	.37**	-.06	.18*	.06	–	.03	.25**	-.03	.07

11. Religiosity	4.29 (2.10)	3.93 (2.18)	.11	-.25**	.15	.11	.22**	.22**	.36**	.27**	-.17*	.01	—	-.09	-.09	-.01
12. Gender discrimination experience	2.03 (1.15)	1.55 (.92)	.11	-.20*	-.02	.20*	.25**	.22*	-.09	.42**	.28**	.43**	.15	—	-.24**	.19*
13. Household income	4.08 (1.81)	4.85 (1.65)	.14	-.06	.13	.05	.01	-.07	.12	-.11	.07	-.11	-.05	-.08	—	-.11
14. Rural/urban	3.30 (1.08)	3.24 (1.04)	-.19*	.09	-.11	-.04	-.04	-.07	-.15	.04	.23**	-.03	-.10	.06	.02	—

Notes: Political Orientation (higher = more conservative); Traditional-Egalitarian Sex Roles (higher = egalitarian); ASI = Ambivalent Sexism Inventory;
 AMI = Ambivalence towards Men Inventory; Rural/urban (higher = urban). * $p < .05$, two-tailed. ** $p < .01$, two-tailed.

4. Description of three mode principal component analysis

A comprehensive treatment and practical examples of 3MPCA can be found in the books by Kroonenberg^{8,9}. Here we focus on the analytic decisions and details specific to this research, specifically relating to centering/normalisation of the data prior to analysis, how components were selected, and how differences between participants are modeled.

Three-mode principal component analysis (“3MPCA”) is a data-analysis technique that summarises systematic relationships in data that has three distinct sources of variation (“modes”). In this case the three modes were a set of *groups* (e.g., leader, women, men) that were rated on a set of *traits* (e.g., dependent, moral) by a set of *participants*. So groups, traits, and participants were the three modes in this research, with the data structure represented in Figure S1.

Figure S1. Visual representation of the three-mode data structure in this research.

Data centering and normalisation

Centering is a critical consideration for three-mode principal component analysis as it determines which parts of the data are analysed, and hence its interpretation^{9,10}. With three modes, many types of centering are possible (across single modes or combinations). For this research we used *double-centering*. This means that the 3MPCA is carried out on the group-x-trait interaction (the main focus of the analysis), individual differences between participants contained in their overall mean, and the three-way interaction, i.e., the interaction between groups, traits, and participants.

It is also possible to normalise scores to eliminate differences in scale variability to account for differences in rating scale usage. In this study it was considered that variance of the scales was also informative, so no normalisation was applied.

Model selection and assessment of fit

Like standard principal components analysis, the goal of 3MPCA is to find an acceptable trade-off that optimises parsimony (fewest number of components) and fit (amount of variance accounted for). This relies on researcher judgement, aided by statistical considerations and interpretability of the components.

Statistically, the fit of each combination of components can be visualised using a three-mode scree plot (below) which shows the residual sum-of-squares associated with each model from the simplest model with 1 component in each mode (1×1×1) to the most complex considered (3×3×4; 3 group components × 3 trait components × 4 participant components). The optimal model is guided by identifying an “elbow” or inflection point that reflects a parsimonious solution – a good trade-off between model complexity and explanatory power (variance accounted for), similar to “standard” principal component analysis.

Study 1. The scree plot (Figure S2) suggested that 2×2×2 model gave an acceptable trade-off between parsimony and fit. We also examined the 2×2×3 model but this accounted for only 2% additional variation, which we considered not to represent sufficient additional explanatory power to warrant a more complex model. Hence, we selected the 2×2×2 model, which accounted for 33% of the variation in ratings.

Figure S2. Three-mode scree plot presenting model selection (Study 1)

Study 2. The scree plot for Study 2 (Figure S3) was similar to Study 1, with a shallow inflection point for the 2×2×2 model. Again we examined the 2×2×3 model and found it accounted for only 2% additional variance. The selected the 2×2×2 model accounted for 28% of the variation in ratings.

Figure S3. Three-mode scree plot presenting model selection (Study 2)

Mapping associations between groups and traits (biplots)

Interpreting relations between modes can be assisted by biplots¹¹⁻¹³, which means that components are represented in a common space so relationships between the elements of the modes can be inspected. We were most interested in the relations between groups and traits. As groups and traits both had two components, they could be straightforwardly combined in a two-dimensional biplot (with one dimension representing each component) with separate biplots for each of the two participant components (Figures 3 and 4 in the article).

In creating the biplots we used *symmetric scaling*, which rescales the components so their lengths are similar across modes to make relationships between modes easier to observe. Although the relationships between elements is unchanged, this rescaling means each mode uses different units so axis units were not displayed in figures. In Figure 3 of the article we also rotated the biplots to facilitate comparisons between studies by making the Power dimension vertical in both studies.

In the article we noted that the second participant component could be represented using only one dimension. This was suggested by calculating the variance explained by each combination of trait and group components (called a core slice), shown in Table S6. For

Participant Component 1, both the first and second elements of the core slice accounted for sizeable variability (at least 7.1%, see boldfaced entries). However, for Participant Component 2 a single element of the core slice accounted for almost all the variation in that component (in Study 1, 3.5% out of a total of 4.2%; in Study 2, 3.5% out of a total of 4.1%). This means that the joint plot can be reduced to one dimension for this component as the second dimension explains negligible variance.

Table S6. Percentages of variability accounted for each of the two core slices associated with the two participant components (with the highest percentages boldfaced).

	Participant Component 1			Participant Component 2	
Study 1					
Total	28.8%			4.2%	
	1	2		1	2
1	18.1	0.9		0.5	3.5
2	0.8	9.0		0.1	0.1
Sum	18.9	9.9		0.6	3.6
Study 2					
Total	23.8%			4.1%	
	1	2		1	2
1	16.2	0.2		0.2	0.0
2	0.3	7.1		3.8	0.1
Sum	16.5	7.3		4.0	0.1

5. Participant component scores and their associations

Every participant has a score on each participant component that indicates how strongly the associated maps represent their ratings. Expressed differently, each participant component score functions as a weight for the biplot, indicating how much the biplot is relevant for that participant.

A participant component score close to zero means that the biplot is irrelevant for this person. A high positive score means that the biplot contributes considerably to portraying how the person sees the relations portrayed in the biplot. A high negative score means that the relations between groups and traits rated are reversed. As components are orthogonal, it is possible for persons to have high scores on more than one participant component. In these cases, an individual's responses are more complex to understand, as the corresponding joint biplots need to be combined to give a good representation of their data.

Graphically, a negative participant component score can be represented in a biplot by reversing the direction of one of the modes – in Figure 4 of the article we accomplished this by reversing the direction of the groups (arrows) while holding the positions of the traits (points) constant. Hence, there is a figure for “positive scores” and for “negative scores” because for the second participant component a substantial proportion of participants had negative participant component scores. We did not do this for the “consensus” plot (Figure 3 in the article) as no participants had strong negative component scores.

To help understand who holds each pattern of stereotypes, we correlated participant component scores with demographic and attitude measures. Table S7 shows the demographic measures used across both studies. We have arranged the correlations by components, rather than by study, to facilitate comparisons across studies.

For participant component 1, consistent findings across Study 1 and Study 2 were that those working in higher levels of management and who reported a higher percentage of women leaders working in their industry endorsed the model less. Unrelated to endorsement of component 1 across studies was participant gender, political orientation and the percentage of women employees working in their industry.

Inconsistent findings across studies were for age, ethnicity and education level. For age, there was no relationship with endorsement of component 1 in Study 1, but in Study 2, older participants showed greater endorsement. For ethnicity, there was no relationship with endorsement of component 1 in Study 1, but in Study 2, White (compared to other ethnicities) participants showed greater endorsement. For education, participants with lower education levels endorsed component 1 more in Study 1, but in Study 2, there was no relationship with education level and endorsement.

For participant component 2, which amounted to valence judgements of the groups, participants were almost equally split between positive and negative scores (Study 1: 49% positive; 51% negative; Study 2: 46% positive, 54% negative).

Those with positive component scores viewed women more positively than men and leaders and were more likely to be politically liberal (in both studies), and in Study 2, but not in Study 1, in lower management or non-managerial roles and women. Those with negative

component scores viewed men and leaders more positively than women and were more likely to be politically conservative (in both studies), and in Study 2, but not in Study 1, in higher levels of management and men.

In Study 1 and Study 2, endorsement of component 2 was not related to age, ethnicity, education, the percentage of women employees participants reported worked in their industry, or the percentage of women leaders participants reported worked in their industry.

Table S7. Correlations between participant component scores and measures used in both studies.

	Participant Component 1		Participant Component 2	
	Study 1	Study 2	Study 1	Study 2
1. Gender	-.09	-.08	-.10	-.14*
2. Age	-.01	.24**	.00	.04
3. Ethnicity	.02	-.25**	.07	.02
4. Education [^]	-.12*	.04	.07	-.06
5. Management level [^]	-.11*	-.14*	-.10	-.21**
6. % women leaders	-.11*	-.28**	-.02	.03
7. % women employees	.06	-.07	.06	.03
8. Political orientation	-.08	-.01	-.44**	-.26**

Note. Gender (0 = women, 1 = men); Ethnicity (1 = White; 2 = other ethnicities).

[^]Spearman's rank order correlation

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

Tale S8 shows the additional measures included in Study 2 to understand who holds each pattern of stereotypes.

For participant component 1, those higher in modern sexism, hostile sexism, benevolence towards men, and zero-sum perspectives on gender discrimination endorsed component 1 less, as did those higher in social dominance orientation and religiosity. Whilst those with more egalitarian (than traditional) sex role beliefs endorsed component 1 more.

Endorsement was not related to household income, whether people lived in a more rural or urban location, feminist identification, benevolent sexism or hostility towards men.

For participant component 2+ (indicating positive correlations with the positive map in Fig 4c), which amounted to valence judgements of the groups (Study 1: 49% positive; 51% negative; Study 2: 46% positive, 54% negative), participants with positive scores viewed women more positively than men and leaders, and were more likely to identify as feminist, have experienced gender discrimination in the past year, be less religious, lower in social

dominance orientation, lower in modern sexism, lower in hostile sexism, lower in benevolence towards men, and have lower reported household income and more egalitarian sex role beliefs.

Those with negative participant component scores viewed men and leaders more positively than women and were less likely to identify as feminist, less likely to have experienced gender discrimination in the past year, be more religious, higher in social dominance orientation, higher in modern sexism, higher in hostile sexism, higher in benevolence towards men, have higher reported household income and more traditional sex role beliefs.

Participant component 2 scores were not related to zero-sum perspectives on gender inequality, benevolent sexism, hostility towards men, or whether participants lived in a more rural or urban locations.

Table S8. Moderators of endorsement of plots (consensus and non-consensus) for scales unique to Study 2.

	Participant Component 1	Participant Component 2+
1. Feminist identification	.05	.16**
2. Gender discrimination	-.29**	.14*
3. Zero-sum perspective on gender inequality	-.21**	-.09
4. Religiosity	-.15*	-.18**
5. Social Dominance Orientation	-.27**	-.16**
6. Traditional-Egalitarian Sex Roles	.45**	.16**
7. Modern sexism	-.23**	-.25**
8. Ambivalent Sexism Inventory—Hostile	-.26**	-.22**
9. Ambivalent Sexism Inventory—Benevolent	-.09	-.05
10. Ambivalence towards Men Inventory—Hostility	.05	.09
11. Ambivalence towards Men Inventory— Benevolence	-.23**	-.16**
12. Household income	.09	-.15*
13. Rural/urban location	-.09	.04

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

Table S9 shows how party affiliation corresponded to scores on participant components 1 and 2 across Study 1 and Study 2. Party affiliation did not correspond to endorsement of component 1 in either Study. For component 2, across both studies on average Democrats had a more positive view of women than of men and leaders, and Republicans had a more positive view of men and leaders than of women. Independents were more like Republicans in Study 1 and were neutral in Study 2.

Table S9. Means (Standard Deviations) and contrasts for effects of party affiliation (Republican, Democrat, Independent) for Participant Component 1 and Participant Component 2.

Study 1	<i>F</i> value	<i>p</i>	Republican (<i>n</i> =55)	Independent (<i>n</i> =81)	Democrat (<i>n</i> =199)
			M (SD)	M (SD)	M (SD)
Participant Component 1	1.28	.278	.51 _a (.26)	.46 _a (.21)	.50 _a (.22)
Participant Component 2	20.16	<.001	-.12 _a (.18)	-.07 _a (.22)	.04 _b (.21)

Study 2	<i>F</i> value	<i>p</i>	Republican (<i>n</i> =92)	Independent (<i>n</i> =104)	Democrat (<i>n</i> =86)
			M (SD)	M (SD)	M (SD)
Participant Component 1	.49	.613	.43 _a (.26)	.43 _a (.25)	.40 _a (.27)
Participant Component 2	9.46	<.001	-.08 _a (.19)	.00 _b (.20)	.05 _b (.21)

Note. Means in the same row that do not share a subscript differ at $p < .05$.

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