

## On the semantic consequences of referring to a person using only their last name: Effects of gender-marked pronouns on dependency-building

How we refer to someone matters. Whether I choose to refer to someone as *Sofia*, *Sofia Romano*, *Professor Romano* or *Romano* is influenced by numerous factors. My choices also influence others' impressions. Our work focuses on the phenomenon of referring to people with last-name only (e.g. *Hedberg came in*, *Ramirez was promoted*, ex. 1a-b). Although last-name-only style does not carry an explicit marker of male gender (and does not have male *phi*-features, in theoretical terms) and *can* also be used for women (ex. 1c), in multiple contexts (e.g. politics, academia, sports, science, even informal conversation), men are more likely to be referred to by last-name-only than women (**male bias**, e.g. McConnell-Ginet 2003, Atir & Ferguson 2018). Moreover, referring to a researcher by last-name only results in them being judged more famous, more eminent, and more deserving of awards (**eminence bias**, Atir & Ferguson 2018). Thus, the bias to use last-name-only more for men than for women is not without consequences.

We have two aims. **(1)** We ask whether these two semantic biases – the male bias and the eminence bias – associated with the last-name-only form are sufficiently strongly linked to this particular referential/linguistic form that they emerge even in impoverished contexts, when speakers lack rich mental representations of the referents. (Atir & Ferguson 2018 looked at naturalistic communication and other rich contexts where people knew a lot about the referents, and did not look at pronoun use.) **(2)** We also test whether the male bias of the last-name-only format is strong enough to persist when pitted against a different and well-established semantic bias (verbs' implicit causality (IC) biases).

**Exp.1** (20 targets, 22 fillers, 91 native U.S.-English speakers) used sentence-completion. Participants read sentences ending in 'because + pronoun' and wrote continuations. We manipulated: **(i)** the verb's implicit causality (IC) bias: When followed by an explanation relation signaled by *because*, does the verb elicit mostly subject (IC1) or object (IC2) continuations? (Verbs selected based on Hartshorne & Snedeker 2013), **(ii)** whether the pronoun prompt is *he* or *she*, and **(iii)** whether the verb is *eminent* (presents the IC biased referent in a positive light, e.g. IC1: *impressed*, IC2: *promoted*) or *noneminent* (presents the referent in a negative light, e.g. IC1: *disappointed*, IC2: *despised*). Targets contained one first-name referent and one last-name referent. The last name was always in the position favored by verbs' IC bias (subject/IC1 verbs, object/IC2 verbs). This was done to pit verb bias and male-bias against each other. Examples are in (2-3).

**Results Exp.1:** Data were double-coded by coders blind to condition (to ensure coders' own biases have no effect). Fig.1 shows the *proportion of verb-bias-compatible continuations* – i.e., how often participants use the pronoun to refer to the referent favored by the verb's IC bias (subject of IC1 verbs, object of IC2 verbs). Recall that this referent is realized using last-name-only. **He conditions** show clear verb bias effects: eminent and non-eminent IC1 verbs elicit mostly subject continuations ( $p's < 0.001$ ), eminent and non-eminent IC2 verbs elicit mostly object continuations ( $p's < 0.001$ ). Thus, in the *he* conditions we observe the normal IC patterns familiar from prior work on implicit causality.

Strikingly, none of the **she conditions** show a rate of verb-bias-compatible continuations above chance. The rate of verb-bias-compatible continuations does not differ from chance with eminent IC1 and IC2 verbs or with noneminent IC1 verbs, and is in fact below chance with noneminent IC2 verbs. In other words, with *she*, even when the IC bias pushes towards the last-name-only referent (e.g. 'Smith' in *Smith impressed Amanda because she...*), participants are reluctant to interpret that referent as the antecedent of the pronoun *she* – despite the verb biasing it. This reveals a *dispreference for interpreting a last-name-only form as referring to a female referent*. These patterns show up in the responses of both male and female participants.

Further analyses show that with IC2 verbs, verb-bias-compatible continuations are less frequent with non-eminent objects with both *he* and *she* ( $p < .002$ ,  $p < .02$ ). We attribute this to the **eminence bias**: If last-name-only style is associated with eminence, participants could be reluctant to provide explanations of why a last-name-referent would be being *criticized*, *despised*, *distrusted* etc. This pattern obtains with both *he* and *she*, indicating that the eminence effect is at play also when the pronoun signals the referent is female. In contrast to IC2 verbs, IC1 verbs show no effects of (non)eminence; perhaps they are masked by the greater overall prominence of subjects. This an important direction for future work.

**Exp.2** was the same as Exp.1 (101 new participants), but now we primed people first with 5 paragraphs about famous female scientists that used last-name-only reference for female referents (ex.4), to see priming/exposure could boost willingness to interpret last-name-only referents as female. **Results:** As shown in Fig.2, the results replicate Exp.1. There is no sign of the male bias (or the eminence bias) weakening.

**In sum**, the dependency-building elicited by gender-marked pronouns shows that referring to someone by last-name only triggers strong semantic inferences in comprehenders' minds, at least in the U.S. English context: the male and eminence biases persist even in impoverished contexts, and the male bias persists even when pitted against established verb IC biases, and seems unaffected by priming.

(1a) “I would go so far as to say that had Watson and Crick not come into Rosalind's photograph -- by hook or crook; whichever way it was -- they would have lost the race entirely” (from a podcast by the Scientific American on Dr. Rosalind Franklin)

(1b) “Johnson is a great professor. He is funny” (from ratemyprofessor.com)

(1c) “Welsh is my favorite professor. She's just amazing” (from reddit.com)

(2) IC1 verb (subject-biased)

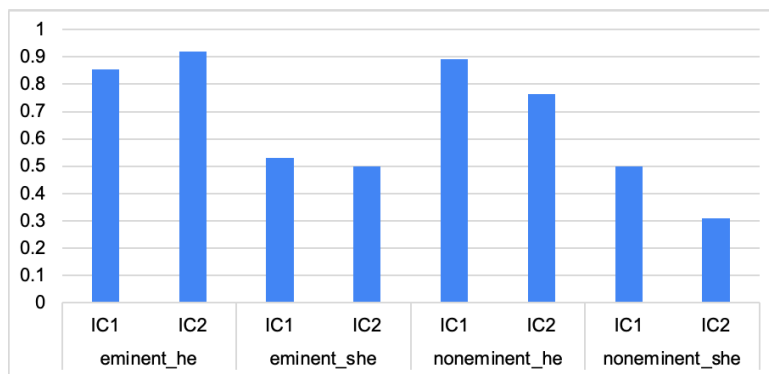
- |   |                          |
|---|--------------------------|
| (a) Smith impressed Eric because he       | [he + eminent verb]      |
| (b) Smith impressed Amanda because she    | [she + eminent verb]     |
| (c) Smith disappointed Eric because he    | [he + non-eminent verb]  |
| (d) Smith disappointed Amanda because she | [she + non-eminent verb] |

(3) IC2 verb (object-biased)

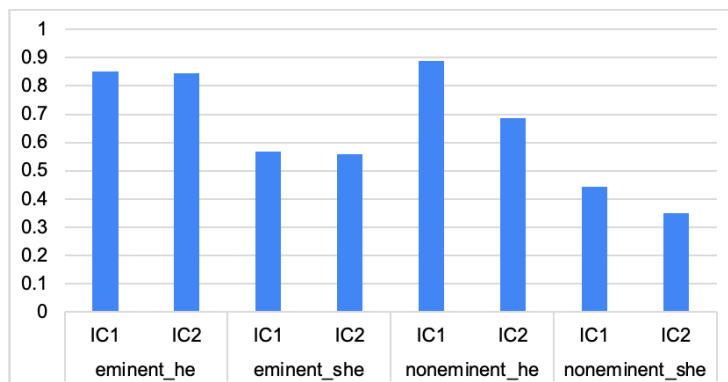
- |  |                          |
|--|--------------------------|
| (a) Frank promoted Mayfield because he   | [he + eminent verb]      |
| (b) Claire promoted Mayfield because she | [she + eminent verb]     |
| (c) Frank despised Mayfield because he   | [he + non-eminent verb]  |
| (d) Claire despised Mayfield because she | [she + non-eminent verb] |

(4) Example of female scientist paragraph from in Exp2 (*We also asked comprehension questions*)

Dr. Rosalind Franklin was an English chemist who lived from 1920 to 1958. An expert in x-ray crystallography, she made groundbreaking contributions to the study of genetics, in particular the molecular structure of DNA (deoxyribonucleic acid) and RNA (ribonucleic acid). Today, Franklin is perhaps best known for the x-ray diffraction photographs that she and a graduate student, Raymond Gosling, took of DNA fibers. These include the famous “photo 51,” showing the three-dimensional structure of DNA. However, Franklin is sometimes called the “dark lady of DNA” because her important role in the discovery of a second type of DNA and its remarkable double helix structure went largely unrecognized for decades. Nevertheless, Franklin’s pioneering work on the molecular structure of coal and viruses was already appreciated during her lifetime. In fact, Franklin’s discoveries helped the Allies use more fuel-efficient coal during World War II. Franklin died of ovarian cancer at age 37, but her team continued her research which eventually won the Nobel Prize in Chemistry in 1982.



**Fig.1 Experiment 1:** Proportion of continuations that are compatible with the verb’s implicit causality bias (subject with IC1 verbs, object with IC2 verbs)



**Fig.2 Experiment 2 with priming manipulation:** Proportion of continuations that are compatible with the verb’s implicit causality bias (subject with IC1 verbs, object with IC2 verbs)