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Metaphor-enriched social cognition and

spatial bias in the courtroom

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Abstract

It is known that courtroom decisions can be influenced by subtle psychological biases, such as asking leading questions. Informed by metaphor research on the connection between spatial proximity and intimacy (e.g., 'we are *close*', 'their views are *far apart*'), this paper reports four experiments that look at the potential role of psychological biases arising from the spatial layout of a courtroom. In particular, we ask the question: Does being close or far to a defendant influence one's reasoning about who is likely to win or lose a court case? Working with an American (jury-based) legal system as an example, our experiments manipulated the physical distance between the jury box and the defendant's table as shown on images of a courtroom. Across several manipulations, we discovered that participants judged the defendant to be more likely to win when the defendant's table was located close to the jury box. These studies are in line with the research on "metaphor-enriched social cognition", showing that the way we talk about relationships in terms of space corresponds to social reasoning in a spatial world.

Keywords: social distance; spatial metaphor; spatial bias; courtroom layout

1.   **Introduction**

When English speakers talk about relationships they often use language that directly relates to space. They often make statements such as 'I feel very *close* to my roommate', 'The newlyweds are *drifting apart*', and 'He feels *distant* from his co-workers' (Lakoff & Johnson, 1980). In such statements, the source domain of SPACE or PHYSICAL DISTANCE is used to refer to the target domain of INTIMACY or SOCIAL DISTANCE. Such metaphorical statements are pervasive in discourse about social relationships, including friendships, work relationships, and romantic relationships (see Matthews & Matlock, 2010).

Expressions such as 'I feel very *close* to my roommate' have been discussed in Conceptual Metaphor Theory (Lakoff & Johnson, 1980; Gibbs, 1994; Kövecses, 2002) under the banner of the conceptual metaphor SOCIAL DISTANCE IS PHYSICAL DISTANCE, or alternatively, INTIMACY IS CLOSENESS. This metaphor is best characterized as a primary metaphor (Grady, 1997, 2005; Winter & Matlock, 2017), a basic metaphor that derives from repeated experience with statistical regularities in our environment, in this case the pervasive correlation between physical distance and social distance. For example, we generally surround ourselves with people we like or grow up with, such as family members. Such individuals are often both spatially and socially 'close' to us. Such associations are thought to ultimately lead to an entrenched *mental* association between the social and the physical (for discussion, see Winter & Matlock, 2017), which ultimately is thought to underlie linguistic metaphorical expressions such as 'I feel very *close* to my roommate'.

In social psychology, researchers are increasingly recognizing the importance of metaphor, a movement that has been described as characterizing "metaphor-enriched social cognition" (Landau, Meier & Keefer, 2010). Many aspects of social

life are talked about in terms of more concrete phenomena. For example, people are described as *warm* or *cold* or *deep* or *shallow*. Behavioral experiments show that these ways of talking about social phenomena are mirrored in non-linguistic thought. For example, holding a warm cup can make people perceive family members as more likeable (Williams & Bargh, 2008), in line with metaphorical statements such as 'she has a *warm* personality'. People are also quicker to judge whether a manager is more powerful than an assistant if the word *manager* is displayed above the word *assistant* (Schubert, 2005), in line with such metaphorical statements as 'she is at the *top* of the hierarchy'.

These findings from social psychology are important for many reasons. Within the domain of metaphor research itself, the findings support the idea that metaphor is more than a linguistic flourish or rhetorical device; rather, they empirically demonstrate that metaphor underlies much of our everyday thought, a core tenet of Conceptual Metaphor Theory. Despite early skepticism about the psychological reality of conceptual metaphor (see Murphy, 1996, 1997), there is now substantial evidence showing that metaphor figures into our thinking about many dimensions of life, including social life (see Landau et al., 2010). In line with this burgeoning research movement, our work shows how metaphorical thinking patterns may be relevant in the social context of courtrooms and legal decisions.

Courtrooms are physical spaces where decision-making demands objective reasoning about important matters. Judges are trained to make impartial decisions. Attorneys are required to adhere to strict codes of conduct. Jurors are instructed to be objective. However, bias is known to creep into courtroom reasoning. Courtroom decisions can be biased by race (Sommers & Ellsworth, 2001), gender (Cohen & Peterson, 1981) and emotions (Horowitz, Kerr, Park, & Grockel, 2006). Language is

also known to create bias. For example, Loftus and Palmer (1974) showed participants videos of car crashes and subsequently asked 'About how fast were the cars going when they *smashed into each other*?' or '*bumped into each other*?'. Participants gave higher speed ratings after the first question even though they saw exactly the same videos. Similarly, the grammar of the question asked ('What was happening?' versus 'What happened?') can lead to differences in how people report on previously seen car accidents (Matlock, Sparks, Matthews, Hunter & Huette, 2012; see also Sherrill, Eerland, Zwaan & Magliano, 2015, for comparable results showing influences of grammatical aspect on reasoning about murder).

The current research looks at the layout of a typical courtroom and whether spatial distance can influence social reasoning in legal contexts. The layout of the courtroom is closely tied to what a culture thinks of its legal system (Mulcahy, 2010). In a historical analysis of courtrooms, Mulcahy (2010) discusses how the courtroom is a social space connected to perceptions of civic pride, class, equality and justice. She notes that the "social significance of court architecture has long been neglected by academics" (Mulcahy, 2010: 3). Our study looks specifically at the role of DISTANCE in courtroom settings. More generally we are interested in the above-mentioned metaphor SOCIAL DISTANCE IS PHYSICAL DISTANCE / INTIMACY IS CLOSENESS. We examine the American courtroom, which, in some cases, involves a jury that participates in the process of deciding whether a defendant is guilty or innocent. We are especially interested in how physical distance between the jury box and the defendant's table might influence reasoning in court cases.

Physical distance and social distance are known to be linked (Bishop, 2008; Christakis & Fowler, 2009; Hall, 1966). In a study by McCall, Bunyan, Bailenson, Blascovich and Beall (2009), groups of people attended a lecture inside a virtual

learning environment. Participants positioned immediately in front of the lecturer reported liking the lecturer more and feeling more persuaded by the lecturer's arguments than people positioned at the back of the virtual classroom. In Williams and Bargh (2008), participants were asked to draw two dots close to each other or far from each other on a coordinate system on a sheet of paper. People in the close dot condition reported feeling more attached to family members than did people in the far dot condition (Williams & Bargh, 2008; see, however, Pashler, Coburn & Harris, 2012). In Matthews and Matlock (2011), participants drew lines on a map to represent delivery routes through a park. They drew their lines closer to bystanders (stick figures on the map) when they believed the bystanders were friends, not strangers. In Winter and Matlock (2013), participants judged people displayed as being spatially close to each other as more similar than people displayed as being spatially distant. More generally, social distance is known to influence everyday thought, including social decisions (Akerlof, 1997; Kim, Schnall, Do-Joon, & White, 2013). All these findings support the idea that people readily anchor their understanding of social distance in terms of spatial distance (Lakoff & Johnson, 1980; Landau et al., 2010).

In light of these and other findings, and in light of the prediction made by Conceptual Metaphor Theory that metaphors affect thinking, spatial distance may very well play a role in how jurors and others in the courtroom reason and make decisions. This paper reports a series of experiments that lend support to this idea. Because we do not examine real courtrooms, our studies are to be taken as a proof-of-concept demonstration. We are interested in whether biases associated with social distance will emerge in reasoning about legal decisions that happen in a courtroom. In particular, because the jury box is often closer to the prosecutor's table than the

defendant's table in American courtrooms (Shepard, 2005), will we see bias against the defendant?

2. Experiment 1

2.1. Method

Our experiments used hypothetical courtroom scenarios that were visually displayed on a computer screen. We ran each experiment on Amazon Mechanical Turk (see Bohannon, 2011) with adult participants from across the United States. We were especially interested in how participants would reason about whether the defendant or prosecutor would win a case, and how this would vary depending on distance between the jury box and the defendant's table. Some of our experiments used a side view of the courtroom (3D depiction of courtroom), and others, an areal map-based view (2D depiction). The experiments vary on the amount of detail they provide on the actual court case, moving from absolutely no context on the case (Experiments 1 to 2) to short vignettes that describe a hypothetical hit-and-run accident and include some biasing language (Experiments 3 and 4). We ran separate participants across all experiments, i.e., no participants participated in any experiment twice[1].

In Experiment 1, 105 participants were recruited via Amazon Mechanical Turk. To ensure that they knew some basics about court cases, including which parties are typically involved in an American trial, they were first required to read generic information about prosecutors and defendants as well as information about juror's duties. Right after this, participants read the following instructions:

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[1] We collected no demographic information about participants because it was beyond the scope of this study. Moreover, Conceptual Metaphor Theory makes no predictions about how certain demographic groups will or should respond in this particular case, especially because all participants are expected to have experienced the same underlying correlation of social and physical distance.

"Imagine you are one of the jury members, and you analyze the layout of the courtroom. Without knowing details about the case, click on the table that you feel is most likely to win."

Immediately after clicking a start button on the screen, participants were presented with a picture of a courtroom on the screen, shown from the perspective of where jurors would be seated in an actual courtroom. The courtroom scene included two tables, one marked 'Prosecutor', and another, 'Defendant', as shown in Figure 1. The courtroom scene remained on the screen until participants clicked on one of the two tables. For participants in the close condition, the defendant's table was located near the jury box. For participants in the far condition, it was far from the jury box.

Defendant Close   **Defendant Far**
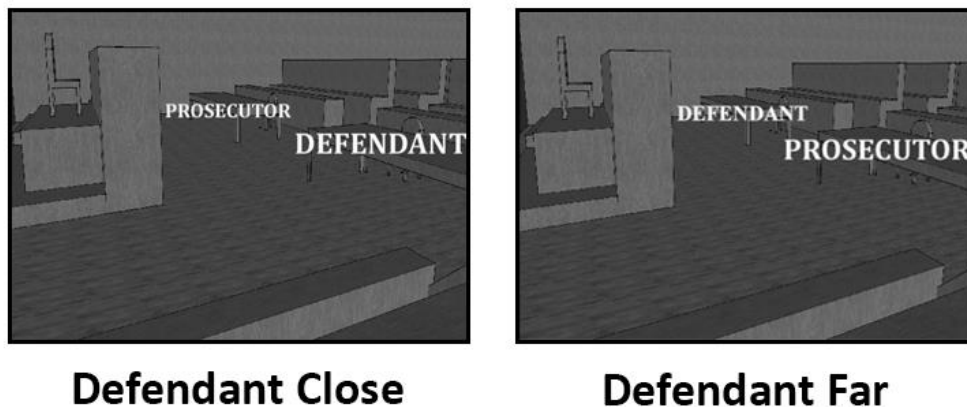
Figure 1: Courtroom pictures that were used in Experiment 1. (For Experiments 2-4, the font size for the labels 'Defendant' and 'Prosecutor' was the same size)

Participants selected the winner by clicking on one of the two tables, and then indicated how confident they were about their selection on a scale from 1 (not confident) to 9 (very confident). They also indicated whether they had ever served on a jury. Of the 105 participants, 14 reported having served on a jury (~13%).

We also manipulated the side of the room the defendant's table was seen on to make sure any effects that arose were not be driven by a left-right distinction, i.e., the

defendant table was either shown on the left or the right side in the image. The right side is often viewed more positively than left, at least for right-handers (see Casasanto, 2009; Casasanto & Chrysikou, 2011). The design of this experiment was a 2 X 2, with the factors of Distance (close versus far distance between Defendant and Prosecutor) and Table Orientation (left versus right).

2.2. Analysis

All analyses were conducted with R (R Core Team, 2014). In line with standards for reproducible research in data science, the full data and analyses are available on the following GitHub repository:

https://github.com/bodowinter/courtroom_experiment

Because the dependent measure is a binary choice (defendant versus prosecutor), we used logistic regression throughout our analyses. Logistic regression is a standard statistical methodology that enabled us to model the forced choice of defendant versus prosecutor as a function of several different factors. Our logistic regression model included the predictors Distance (close versus far), Jury Experience (served on jury versus did not serve on jury), Room Orientation (jury box left versus right side of room) and Confidence (1 to 9 scale). We also included the interaction term for Orientation * Distance to see whether the affective associations with the left or right view of the room modulate any effects caused by distance. To facilitate the interpretation of main and interaction effects, all our categorical predictors were deviation coded (-0.5 versus 0.5), and all our continuous predictors, centered (Schielzeth, 2010). It should be noted that the results reported below are also obtained if we use Chi-Square tests instead of logistic regression, thus, ignoring all control

variables (such as Confidence). The only mismatch between the two analyses was found in Experiment 3A (reported below).

2.3. Results

First, we observed a reliable effect of Distance (log odds: 1.47, $SE = 0.44$, Wald's $z = 3.34$, $p < 0.001$), represented in Figure 2. When the defendant's table was located close to the jury box, 31 participants (67%) selected the defendant and 15 selected the prosecutor (33%). When the defendant's table was far from the jury box, only 18 picked the defendant (31%) and 41 (69%) picked the prosecutor. Table 1 shows the exact counts of defendant and prosecutor responses as a function of distance for all experiments reported in this paper.

We did not observe a main effect of Confidence (0.06, $SE = 0.11$, $z = 0.53$, $p = 0.60$). Nor did we see an effect of Jury Experience (-0.23, $SE = 0.63$, $z = 0.23$, $p = 0.71$) or Room Orientation (0.56, $SE = 0.48$, $z = 1.07$ $p = 0.29$). Nor did we see an interaction between Distance and Room Orientation (0.18, $SE = 0.86$, $z = 0.2$, $p = 0.84$). Thus, the Distance effect was statistically reliable regardless of whether the room was viewed from the left side or the right side.
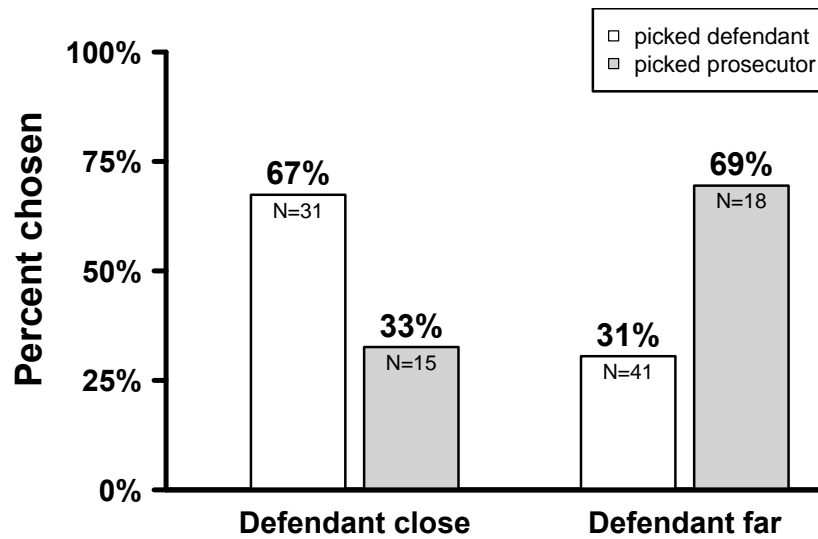
Figure 2: Results of Experiment 1. When the defendant's table was close to the jury, 67% of all participants picked the defendant as the winner. When the defendant's table was far from the jury, only 31% chose the defendant.

		Defendant	Prosecutor	Chi-square
Experiment 1 (N = 105)	**Near**	18	41	$\chi^2(1) = 12.68$
(3D perspective)	**Far**	31	15	$p = 0.00037$
Experiment 1 (N = 117)	**Near**	20	36	$\chi^2(1) = 4.66$
(replication with equal font sizes)	**Far**	35	26	$p = 0.03$
Experiment 2 (N = 102)	**Near**	12	33	$\chi^2(1) = 10.86$
(2D perspective)	**Far**	35	22	$p = 0.00099$
Experiment 3A (N = 122)	**Near**	22	38	$\chi^2(1) = 3.36$
(2D perspective with language)	**Far**	34	28	$p = 0.067$
Experiment 3B (N = 122)	**Near**	22	40	$\chi^2(1) = 2.07$
(3D perspective with language)	**Far**	30	30	$p = 0.15$
Experiment 4A (N = 201)	**Near**	36	67	$\chi^2(1) = 1.66$
(2D perspective with delay)	**Far**	50	48	$p = 0.19$
Experiment 4B (N = 201)	**Near**	37	59	$\chi^2(1) = 4.66$
(3D perspective with delay)	**Far**	51	54	$p = 0.03$

Table 1: Raw counts broken down by distance (marginal sums across all other factors) with corresponding Chi-square tests for all experiments reported below

2.4. Discussion and replication

The results of our experiment suggest bias whereby spatial reasoning influenced social reasoning about a highly stylized and decontextualized court case. Precisely, the distance between the jury box and the defendant and the prosecutor influenced decisions about who would win a court case. Our participants inferred that the defendant would be more likely to win the case when the defendant's table was located closer to the jury box than the prosecutor's table. These results are consistent with prior work on spatial distance and social distance.

One shortcoming of this experiment relates to font size: We used different font sizes for the labels 'Defendant' and 'Prosecutor' to enhance the 3D perspective of the visually displayed room. We cannot rule out the possibility that people preferred to click on the label with the larger font, given that it was more noticeable (see Oppenheimer, 2008, for discussion of how ease of understanding, including readability of fonts, can influence reasoning tasks). To address this concern, we re-ran Experiment 1 with constant font size with 117 new volunteers from Amazon Mechanical Turk (14.5% reported having served on a jury). We replicated the Distance effect (0.87, $SE = 0.38$, $z = 0.26$, $p = 0.024$). In the close condition, 35 participants (57%) picked the defendant and 26 participants (43%) picked the prosecutor. In the far condition, only 20 participants (36%) picked the defendant, and 36 participants (64%) picked the defendant. The results rule out the possibility that

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font size drove the effects of Experiment 1.[2] Still, participants could have felt more

drawn to the closer table in the courtroom because it was in the foreground and

appeared larger. To address this, we used aerial view of the room in Experiment 2.

4. Experiment 2

4.1. Method

For Experiment 2, we changed the picture of the courtroom, as shown in Figure 3.

Instead of using a side perspective, we used a 2D aerial perspective. To test again

whether Room Orientation (left versus right side of the screen, in line with Casasanto,

2009; Casasanto & Chrysikou, 2011) would matter for this new visual stimulus, we

re-included the left-right manipulation, showing the jury box to the left or to the right

of the two tables. A total of 102 participants were recruited via Amazon Mechanical

Turk. Nine participants reported that they had previously served on a jury (~9%).

Defendant Close   **Defendant Far**
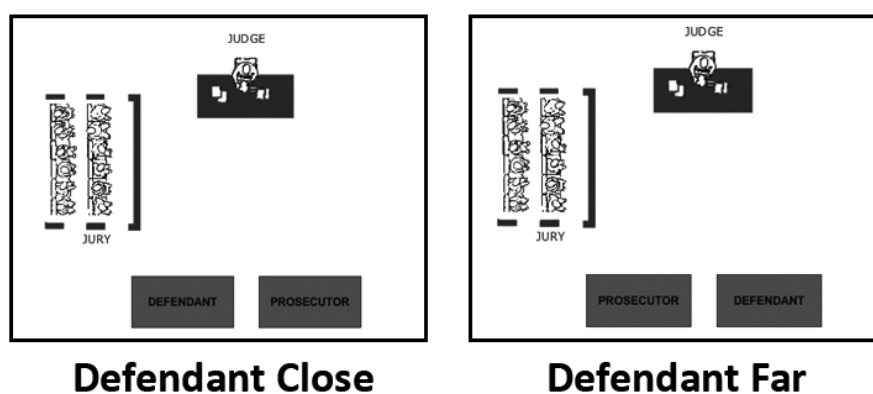
Figure 3: Experiment 2 stimuli (courtroom depiction using a 2D bird-s eye view).

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[2] In an earlier attempt to replicate the Distance effect without the size concern we
failed to find a significant effect (see data and analysis on GitHub). In this particular
version we made the entire tables into clickable areas by superimposing grey boxes on
them. After running the experiment, we realized that it may not have been clear that
the grey boxes represented tables.

4.2. Results

There was an effect of Distance (1.45, $SE = 0.44$, $z = 3.32$, $p = 0.0009$), with 35
participants (61%) as opposed to 22 participants (39%) picking the defendant when
the defendant's table was close to the jury, and only 12 participants (27%) as opposed
to 33 participants (73%) picking the defendant's table in the far condition. As with
Experiment 1, there was no effect of Room Orientation (0.01, $SE = 0.44$, $z = 0.03$, $p =$
0.98) and no Room Orientation * Distance interaction (0.93, $SE = 0.89$, $z = 1.04$, $p =$
0.30). Once again there was no effect of Confidence (-0.01, $SE = 0.11$, $z = 0.12$, $p =$
0.90) or Jury Experience (0.12, $SE = 0.78$, $z = 0.15$, $p = 0.88$).

4.3. Discussion

Experiment 2, a conceptual replication of Experiment 1 (new visual stimulus) shows
that once again participants were more likely to believe the defendant would win
when the defendant was located close to the jury. However, up to this point, none of
the experiments included information about what crimes were committed. It is known
that when participants have insufficient information to make judgments (such as no
information about the nature of a court case), they may pay greater attention to certain
information (such as in our case, space) than they might otherwise do (see Van den
Bos, 2003; Van den Bos, Lind, Vermunt, & Wilke, 1997). Perhaps participants in our
earlier studies paid special attention to the configuration of the courtroom in the
absence of information about crime. We designed Experiments 3A and 3B with the
aim of assessing the distance in the context of a specific crime, i.e., a hit-and-run
accident.

5. Experiments 3A & 3B

5.1. Method

For Experiments 3A and 3B, we ran a total of 244 participants on Amazon

Mechanical Turk. None had volunteered for the previous experiments. A total of 35

reported having served on a jury (~14%). Before viewing the courtroom image,

participants read the following passage on the computer screen:

> John is in court today because he was accused of a hit-and-run accident. The
> defendant has much evidence to show that John was not responsible for the
> accident. Now the jury must make a decision. Click on the table you feel will
> win the case.[3]

Next, participants saw the courtroom. We manipulated the information provided in

the text in a 2 X 2 design. In one case, there was evidence to support the defendant,

and in another, evidence against him (Linguistic Framing Condition, 'for' or

'against'). We also manipulated whether there was a good deal of evidence or little

evidence (Evidence Strength, 'much evidence' versus 'some evidence'). These

manipulations were designed to assess whether the distance effects holds independent

across these conditions, even if the linguistic context biases in the direction opposite

of a distance effect. After reading the passage, one half (Experiment 3A, N=122) was

presented with the bird's eye view (2D), and the other half (Experiment 3B, N=122),

the side view (3D perspective).

5.2. Results

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[3] We recognize that there is a potential ambiguity with 'the defendant', which could
be taken to refer to John or to the attorney who is representing him. However, both
would be sitting at the same table, and distance could play a role in either case.

Experiment 3A (2D map version) replicated the Distance effect[4] (1.12, $SE = 0.48$, $z = 2.37$, $p = 0.02$). In the close condition, 34 participants (55%) selected the defendant and 28 (45%) selected the prosecutor. In the far condition, only 22 participants (37%) selected the defendant, and 38 participants (63%) selected the prosecutor. Again, no effects were obtained for Confidence (0.09, $SE = 0.11$, $z = 0.81$, $p = 0.42$) and Jury Experience (-0.49, $SE = 0.74$, $z = 0.66$, $p = 0.51$). There was a strong Linguistic Framing effect (2.34, $SE = 0.46$, $z = 5.12$, $p < 0.0001$), but no main effect of Evidence Strength ('strong' versus 'weak', -0.35, $SE = 0.45$, $z = 0.79$, $p = 0.43$) and no Evidence Strength * Framing interaction (-1.68, $SE = 0.93$, $z = 1.25$, $p = 0.21$).

Experiment 3B (3D version) failed to replicate the Distance effect (0.41, $SE = 0.47$, $z = 0.88$, $p = 0.38$), but there was a numerical trend consistent with previous experiments, but only in the far condition. In the close condition, 30 participants (50%) picked the defendant and 30 participants (50%) picked the prosecutor. In the far condition, 22 participants (35%) picked the defendant and 40 participants (65%) picked the prosecutor. Consistent with all prior experiments, there were no effects of Confidence (-0.06, $SE = 0.12$, $z = 0.499$, $p = 0.62$) and Jury Experience (0.2, $SE = 0.61$, $z = 0.33$, $p = 0.74$). There was a main effect of Linguistic Framing (-2.6, $SE = 0.48$, $z = 5.45$, $p < 0.0001$) and no main effect of Evidence Strength (-0.43, $SE = 0.48$, $z = 0.896$, $p = 0.37$). In contrast to Experiment 3A, there was an Evidence Strength * Framing interaction (-2.23, $SE = 0.96$, $z = 2.33$, $p < 0.02$), with participants being less likely to pick the defendant ('John') if the text suggested that there was much evidence against him.

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[4] As shown in Table 1, the Distance effect was not indicated to be statistically reliable in the Chi-square analysis of the marginal sums ($p = 0.067$). This may be because the variance account for by the other factors is not captured by a simple Chi-square test. As discussed below, the Chi-square test is significant if data is combined across Experiments 3 and 4, thus increasing the statistical power.

5.3. Discussion

Experiment 3A replicated the Distance effect, showing that Distance influences judgments about the outcome of courtroom trials in situations with a little more context on the court case. Experiment 3B, however, only found a numerical trend. The difference between Experiment 3A and 3B might have to do with processing spatial information on maps versus other depictions (cf. Thorndyke & Hayes-Roth, 1982; Tversky, 2000, 2001), a point to which we return below.

So far, the experiments found an effect of Distance in information-uncertain situations with 3D side views of the courtroom (Experiment 1, but not 3B) and 2D map views (Experiment 2 and 3A). In these cases, participants had to provide a judgment about the outcome of the court case while viewing a picture of the room and clicking on the corresponding tables (the defendant table and the prosecutor table). In real-world court cases, juries generally do not make legal decisions while being inside the courtroom. Instead, they deliberate and make decisions away from the defendant and prosecutor. To emulate this situation a bit more closely, we ran Experiment 4A and 4B, in which participants made decisions *after* having viewed the courtroom.

6. Experiments 4A & 4B

6.1. Method

In Experiment 4A and 4B, we tested a total of 402 participants. Participants first read the context passage from Experiment 3. Then, the courtroom image was displayed for 8 seconds, followed by a separate screen with the question 'Who do you feel will win

the case?' on top of two buttons (one for the defendant, one for the prosecutor). The orientation of buttons was counter-balanced (defendant top, prosecutor top).

We ran 201 participants with the bird's eye version of the courtroom (4A) and another 201 with the side version (4B). As with Experiment 4A and 4B, we included linguistic context with the conditions Linguistic Framing ('for' or 'against') and Evidence Strength ('much' versus 'some'). Of the total of 402 participants, 44 had previously served on a jury (~11%).

6.2. Results

Experiment 4A (bird's eye version) provided another successful replication of the Distance effect (0.79, $SE = 0.36$, $z = 2.2$, $p = 0.03$). In the close condition, 50 participants (51%) picked the defendant and 48 (49%) picked the prosecutor. In the far condition, only 36 participants (35%) picked the defendant and 67 participants (65%) picked the prosecutor. Again, there was no effect of Jury Experience (-0.55, $SE = 0.59$, $z = 0.92$, $p = 0.36$), but this time, there was a confidence effect (0.26, $SE = 0.11$, $z = 2.48$, $p = 0.03$), with participants who were more confident being more likely to pick the defendant. Response Button Orientation had no effect (-0.27, $SE = 0.36$, $z = 0.74$, $p = 0.46$). Again, we found that linguistic context mattered. When the case was framed as being against John, people were less likely to pick the defendant response option (-2.6, $SE = 0.38$, $z = 6.84$, $p < 0.0001$). There was no main effect of Evidence Strength (-0.45, $SE = 0.37$, $z = 1.21$, $p = 0.23$) and no Evidence Strength * Framing Interaction (-1.31, $SE = 0.76$, $z = 1.73$, $p = 0.08$).

As in Experiment 3B, in Experiment 4B (3D version) there was no Distance effect (0.33, $SE = 0.38$, $z = 0.88$, $p = 0.38$), but there was a numerical trend in a

consistent direction: In the near condition, 51 participants (49%) picked the defendant and 54 participants (51%) picked the prosecutor. In the far condition, only 37 participants picked the defendant (39%) and 59 participants (61%) picked the prosecutor. There were no effects of Jury Experience (-0.7, $SE = 0.56$, $z = 1.25$, $p = 0.21$), Confidence (0.09, $SE = 0.1$, $z = 0.95$, $p = 0.34$) or Response Button Orientation (-0.6, $SE = 0.37$, $z = 1.6$, $p = 0.11$). There was a main effect of Linguistic Framing (-2.95, $SE = 0.39$, $z = 7.42$, $p < 0.0001$), but there was no main effect of Evidence Strength (-0.62, $SE = 0.39$, $z = 1.57$, $p = 0.12$) and no Evidence Strength * Framing interaction (-1.29, $SE = 0.79$, $z = 1.65$, $p = 0.09$).

6.3. Discussion

Experiment 4A provided another replication of the Distance effect, this time with added linguistic context and a delayed response that did not arise during the presentation of the room. However, as in Experiment 3B, the 3D side view of the room did not produce a statistically reliable effect, but only a numerical trend. This shows that the result for the map-based view is robust, but the Distance effect appears to be much diminished when context and delay are added to the side view version of the experiment. This could relate to different processing strategies that go along with viewing maps or other schematic spatial representations (Thorndyke & Hayes-Roth, 1982) compared to viewing actual space.

Another possibility is that there is a confounding factor in the 3D side view stimuli. Note that in Figure 1, the far table also occupies a central position in the room. It is known that people have a preference for looking at the center of an image or a computer screen (e.g., Buswell, 1935; Tatler, 2007). As predicted by the mental

connection between space and social distance, the "defendant far" conditions should induce a dispreference to choose the defendant. However, co-present with this dispreference might be a preference to click on the central element of a scene, which would tend to reduce the strength of the Distance effect. Future experiments will need to control for position (central versus non-central) as well as for distance.

7. General Discussion

In summary, across four experiments with 970 participants using stylized courtroom depictions, we showed that the layout of the courtroom can bias how jurors reason about who should win a court case. In general, there was a consistent pattern whereby participants believed that the party sitting closer to the jury would win. The only failures to replicate this effect were Experiment 3B and 4B. That is, in two experiments did the 2D version show an effect, but the 3D version did not. We think that people might engage more deeply in spatial reasoning when viewing the 2D bird's eye version of the courtroom because people are used to inferring spatial relations from maps and other schematic representations (Thorndyke & Hayes-Roth, 1982; Tversky, 2010). Alternatively, the particular spatial images chosen for the 3D side view version may have a centrality confound (see discussion above), with the far condition also being more central, which might reduce any dispreference to click on the far table because of a preference to click on the more central response option provided in the courtroom scene. The 3D version might also appear strange to participants because it is relatively more realistic than the map, yet still highly artificial. Future research will need to show why the distance effect disappeared in this particular condition.

How do these results relate to the metaphor SOCIAL DISTANCE IS PHYSICAL DISTANCE / INTIMACY IS CLOSENESS? The results we obtained here show that reasoning related to the target domain (social relations) is influenced by space, the source domain, in line with expressions such as 'she is a *close* friend' and 'their views couldn't be *further apart*'. To the extent that we manipulated something that belongs to a concrete source domain and observed an effect in more high-level reasoning processes, we followed the "metaphoric transfer strategy" of experimental methods (Landau et al., 2010). It should be pointed out, however, that our findings in no way imply that people somehow "activate" a conceptual metaphor when reasoning about the stimuli we presented. In fact, participants could have made their decisions with "literal" thought. For example, participants might have made the inference that if a defendant was farther away, his facial expressions or eyes were less visible, constraining his opportunity to convey emotions and undermining his ability to participate in the trial (cf. Mulcahy, 2010: 10; see also Bailenson, Blascovich, Beall & Loomis, 2003). Increased distance means less engagement and less opportunity for empathy, which is known to decrease perceptions of lawfulness (Archer, Foushee, Davis & Aderman, 1979). However, even though the results themselves could be due to literal thought, our findings clearly *correspond* to the spatial language that we use to talk about social relations and in this sense indirectly support the idea of the mental presence of the conceptual metaphor SOCIAL DISTANCE IS PHYSICAL DISTANCE.

What are the limitations and challenges of this work? The absence of statistically reliable Distance effects in experiments 3B and 4B may appear to be problematic, however, an analysis combining data from Experiment 3B and 4B yields a statistically reliable Distance effect (simple Chi-square test: $\chi^2(1) = 4.07$, $p = 0.043$). And it should be mentioned that even in the absence of a reliable effect, the numerical

trends observed are still worrisome for the idea of wholly "spatially unbiased"

courtroom decisions, with only 35% of all participants choosing the defendant in the

far conditions of Experiments 3B and 4B, as opposed to 50% participants in the close

condition.

Regarding the limitations of this work, we should again emphasize that in this

set of studies, we are merely probing *thoughts about* courtroom situations rather than

actual courtroom decisions. And we do so in a way that deliberately focuses on the

role of spatial factors at the expense of considering other variables (such as

demographic factors, gender biases or biases resulting from race/ethnic background).

Moreover, as conducting web-based experiments requires keeping surveys short, we

focus on very simple cases as opposed to decisions that result from long

contemplation based on a complex and variegated set of evidence and arguments.

Determining the extent to which the spatial bias discussed in this paper affects actual

courtroom decisions requires in-depth investigation in the future. New work could use

more realistic visual stimuli (e.g., photographs, videos) and more realistic background

information to increase ecological validity. To further increase the realism of the

fictive courtroom, one could even use immersive virtual environments, as was done

by Bailenson, Blascovich, Beall and Noveck (2006).

To conclude, the work reported here expands our knowledge of social distance

and its connection to spatial distance. The findings reveal new insights about how

biases relate to spatial position alone may affect reasoning about guilt and innocence.

Architects and judicial experts recognize the need to create courtrooms that maintain

identities, including the segregation of judge, litigants, jurors (see Mulcahy, 2010).

This paper shows that we should also recognize the potential presence of spatial bias.

In the current American courtroom—where the defendant is most often farther from

the jury than the prosecutor is—the defendant may have an implicit disadvantage from the very start. The final verdict in any legal situation of course depends on a long chain of reasoning that is influenced by a whole swath of factors, most of which are outside the scope of the present investigation. The current results, however, do suggest that spatial setups could be one of those factors that affect decision-making in legal situations.

References

Akerlof, G.A. (1997). Social distance and social decisions. *Econometrica*, *65*, 1005-1027.

Archer, R. L., Foushee, H. C., Davis, M. H., & Aderman, D. (1979). Emotional empathy in a courtroom simulation: A person-situation interaction. *Journal of Applied Social Psychology*, *9*, 275-291.

Bailenson, J. N., Blascovich, J., Beall, A. C., & Loomis, J. M. (2003). Interpersonal distance in immersive virtual environments. *Personality and Social Psychology Bulletin*, *29*, 819-833.

Bailenson, J. N., Blascovich, J., Beall, A. C., & Noveck, B. (2006). Courtroom applications of virtual environments, immersive virtual environments, and collaborative virtual environments. *Law & Policy*, *28*, 249-270.

Bishop, B. (2008). *The Big Sort: Why Clustering of Like-Minded America is Tearing us apart*. New York: Houghton-Mifflin.

Bohannon, J. (2011). Social science for pennies. *Science*, *334*, 307.

Buswell, G. T. (1935). *How People Look at Pictures: A Study of the Psychology of Perception in Art*. Chicago, IL: University of Chicago Press.

Casasanto, D. (2009). Embodiment of abstract concepts: Good and bad in right- and left-handers. *Journal of Experimental Psychology: General*, *138*, 351-367.

Casasanto, D. & Chrysikou, E.G. (2011). When left is "right": Motor fluency shapes abstract concepts. *Psychological Science*, *22*, 419-422.

Christakis, N. A., & Fowler, J. H. (2009). *Connected: The Surprising Power of our Social Networks and how they Shape our Lives*. New York: Little, Brown and Company.

Cohen, D.L., & Peterson, J.L. (1981). Bias in the courtroom: Race and sex effects of attorneys on juror verdicts. *Social Behavior and Personality: An International Journal*, *9*, 81-87.

Gibbs, R. W. (1994). *The Poetics of Mind: Figurative Thought, Language, and Understanding*. New York: Cambridge University Press.

Grady, J. (1997). THEORIES ARE BUILDINGS revisited. *Cognitive Linguistics*, 8, 267-290.

Grady, J. (2005). Primary metaphors as inputs to conceptual integration. *Journal of Pragmatics*, 37, 1595-1614.

Hall, E. T. (1966). *The Hidden Dimension*: *An Anthropologist Examines Man's Use of Space in Public and in Private*. New York: Doubleday.

Horowitz, I.A., Kerr, N.L., Park, E.S., & Gockel, C. (2006). Chaos in the courtroom reconsidered: Emotional bias and juror nullification. *Law and Human Behavior*, *30*, 163-181.

Kim, H., Schnall, S., Do-Joon, Y., & White, M.P. (2013). Social distance decrease responders' sensitivity to fairness in the ultimatum game. *Judgment and Decision Making*, *8*, 632-638.

Kövecses, Z. (2002). *Metaphor: A Practical Introduction*. Oxford, UK: Oxford University Press.

Lakoff, G., & Johnson, M. (1980). *Metaphors we Live by*. Chicago, IL: Chicago University.

Landau, M. J., Meier, B. P., & Keefer, L. A. (2010). A metaphor-enriched social cognition. *Psychological Bulletin*, *136*, 1045-1067.

Loftus, E. F., & Palmer, J. C. (1974). Reconstruction of automobile destruction: An example of the interaction between language and memory. *Journal of Verbal Learning and Verbal Behavior*, *13*, 585-589.

Matlock, T., Sparks, D., Matthews, J.L., Hunter, J., & Huette, S. (2012). Smashing new results on aspectual framing: How people describe car accidents. *Studies in Language*, *36*, 700-721.

Matthews, J. L., & Matlock, T. (2010). The spatial and temporal underpinnings of social distance. In C. Holscher (Ed.), *Spatial Cognition VII* (pp. 19-31). Berlin: Springer-Verlag.

Matthews, J. L., & Matlock, T. (2011). Understanding the link between spatial distance and social distance. *Social Psychology*, *42*, 185-192.

McCall, C., Bunyan, D. P., Bailenson, J. N., Blascovich, J., & Beall, A. C. (2009). Leveraging collaborative virtual environment technology for inter-population

research on persuasion in a classroom setting. *Presence: Teleoperators and Virtual Environments*, *18*, 361-369.

Mulcahy, L. (2010). *Legal Architecture: Justice, Due Process and the Place of Law*. New York: Routledge.

Murphy, G. L. (1996). On metaphoric representation. *Cognition*, *60*, 173-204.

Murphy, G. L. (1997). Reasons to doubt the present evidence for metaphoric representation. *Cognition*, *62*, 99-108.

Oppenheimer, D. M. (2008). The secret life of fluency. *Trends in Cognitive Sciences*, *12*, 237-241.

Pashler, H., Coburn, N., & Harris, C. R. (2012). Priming of social distance? Failure to replicate effects on social and food judgments. *PloS One*, *7*, e42510.

R Core Team (2014). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/.

Schielzeth, H. (2010). Simple means to improve the interpretability of regression coefficients. *Methods in Ecology and Evolution*, *1*, 103-113.

Shepard, S. (2005). Should the criminal defendant be assigned a seat in court. *Yale Law Journal*, *115*, 2203.

Sherrill, A. M., & Eerland, A., Zwaan, R. A., & Magliano, J. P. (2015). Understanding how grammatical aspect influences legal judgment. *PloS One*, *10*, e0141181.

Sommers, S.R., & Ellsworth, P.C. (2001). White juror bias: An investigation of

    prejudice against Black defendants in the American courtroom. *Psychology,*

    Public Policy, and Law, *7*, 201-229.

Tatler, B. W. (2007). The central fixation bias in scene viewing: Selecting an optimal

    viewing position independently of motor biases and image feature

    distributions. *Journal of Vision*, *7*, 4.

Tversky, B. (2000). Some ways that maps and diagrams communicate. In C. Freska,

    W. Brauer, C. Habel & K. F. Wender (Eds.), *Spatial Cognition II: Integrating*

    Abstract Theories, Empirical studies, Formal Methods, and Practical

    Applications (pp. 72-79). New York: Springer.

Tversky, B. (2001). Spatial schemas in depictions. In M. Gattis (Ed.), *Spatial*

    Schemas and Abstract Thought (pp. 79-111). Cambridge, MA: MIT Press.

Tversky, B. (2010). Visualizing thought. *Topics in Cognitive Science*, *3*, 499-535.

Van den Bos, K. (2003). On the subjective quality of social justice: The role of affect

    as information in the psychology of justice judgments. *Journal of Personality*

    and Social Psychology, *85*, 482-498.

Van den Bos, K., Lind, E. A., Vermunt, R., & Wilke, H. A. M. (1997). How do I

    judge my outcome when I do not know the outcome of others? The

    psychology of the fair process effect. *Journal of Personality and Social*

    Psychology, *72*, 1034-1046.

Williams, L. E., & Bargh, J. A. (2008). Keeping one's distance: The influence of

    spatial distance cues on affect and evaluation. *Psychological Science*, *19*, 302-

    308.

Winter, B., & Matlock. T. (2017). Primary metaphors are both cultural and embodied.

In B. Hampe (Ed.), *Metaphor: Embodied Cognition and Discourse*.

Cambridge: Cambridge University Press.