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# Social presence and psychological distance: A construal level account for online distance learning

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## Abstract

Online distance learning presents unique psychosocial characteristics due to the inherent distance between learners. Social presence –the sense of being with others– is key to mitigating this distance. However, our understanding of social presence remains limited, despite its potential to reduce social isolation and cultivate a conducive social space in online education. A gap in our understanding relates to how social presence aligns with more general accounts of interpersonal representations under conditions of psychological distance, as presented in Construal Level Theory. We conducted a vignette-based experiment ($N = 194$) to examine how psychological distance in online learning affects the mental construal level of a hypothetical partner and, thus, social presence perceptions. Findings suggest that increased psychological distance leads to higher-level construals, resulting in a perception of conversation partners as non-descript and homogenous. Importantly, this affects social presence perceptions, with certain nuances. These findings can inform novel approaches to enhance social presence in online learning.

**Keywords** Social presence · Psychological distance · Construal level · Online learning · Distance education · Computer-mediated communication

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## 1 Introduction

Social presence is a psychosocial account of the extent to which communication partners are perceived as 'real' and 'there' in computer-mediated communication (Kreijns et al., 2022). This makes it a key concept for online learning and distance education, bearing on how interpersonal communication unfolds in online learning environments, providing a critical piece to the puzzle of successful learning experiences at a distance (Richardson et al., 2017). While the concept originated in the social psychology of telecommunication (Short et al., 1976), the scope of the concept has considerably widened over the years (Cummings & Wertz, 2023) with research literatures developing a life of their own, in research lines on, amongst others, computer-mediated communication (e.g. Walther, 1992, 1993, 1996), online distance learning (e.g. Weidlich & Bastiaens, 2017; Lowenthal, 2010), computer-supported collaborative learning (Kreijns et al., 2013), virtual reality and virtual worlds (Oh et al., 2023; van Brakel et al., 2023), and others (Arsenyan & Mirowska, 2021; Shin et al., 2019; Hassanein & Head, 2007).

These research lines frequently do not provide psychological mechanisms governing the phenomenon of social presence, although our relatively nebulous grasp of the concept (Weidlich 2021; Lowenthal & Snelson, 2017; Öztok & Kehrwald, 2017) may benefit from such deep accounts. This becomes particularly relevant when attempting to make recommendations for enhancing social presence in online learning practice, the robustness of which hinges on a sound theory of social presence (Kreijns et al., 2022; Weidlich et al., 2022). For example, Lowenthal and Dunlap (2018) present a collection of instructional strategies to establish social presence, some of which are derived from previous research, others gleaned from practical teaching experience. Generally, design recommendations to enhance social presence may be particularly important for learning scenarios with a strong emphasis on social interaction. In particular, computer-supported collaborative learning (CSCL) scenarios rely on successful communication in distributed groups. Here, if and how students perceive their fellow group members to be socially present is of particular relevance, such that a mismatch can lead to unsatisfying learning experiences and hamper group performance (Weidlich et al., 2022). With the current state of social presence theory, there is little basis for predicting the effectiveness of any posited strategy, no less understanding of psychosocial mechanisms underlying the effectiveness, or generating novel strategies from theory.

Undoubtedly, the responsible psychosocial mechanisms of social presence developed long before the possibility of mediated communication and, thus, should have analogues in various social settings (Biocca et al., 2003). While there is increasing research identifying processes and mechanisms governing social presence specifically in online distance learning environments (the SIPS model, see Weidlich & Bastiaens, 2019; Göksün, 2020; Weidlich & Bastiaens, 2017), a heretofore blind spot remains; when and why does one form mental representations with differing degree of abstractness in the first place? As these differing degrees of abstractness are likely what causes us to perceive the other person as

"real" or not, we can reformulate our questions of how social presence emerges much more broadly as: How do we form mental representations of our communication partners and how does this relate to perceptions of social presence?

In addressing this question, our study attempts to situate and embed social presence into a comprehensive theoretical framework, construal level theory (Trope & Liberman, 2010). We first identify areas of alignment between social presence theory and construal level theory in the context of online distance learning, followed by an experimental vignette study to assess evidence for this proposed integration.

## 2 Psychological Distance in Construal Level Theory

Psychological distance refers to the subjective separation between the self and targets of interest such as people or events. Proposed by Trope and Liberman (2010), construal level theory (CLT) is concerned with how psychological distance affects individuals' thoughts and behavior (Trope et al., 2007). It suggests that distance, in terms of time, space, social, or hypothetical dimensions, affects our actions and cognitions. Supported by many lines of converging evidence (Fiedler, 2007; Soderberg et al., 2015), CLT has produced relatively general-level principles about human psychology that can be applied in contexts as varied as consumer research (e.g., Liberman et al., 2007), organizational psychology (Wiesenfeld et al., 2017), environmental psychology (Brügger et al., 2016), and decision making (Raue et al., 2015). Missing, however, are applications of this framework to education and online distance education where CLT may be particularly informative, as we will outline in the following sections.

Two central tenets of CLT are that (1) dimensions of psychological distance are intrinsically connected and (2) psychological distance affects the level of abstractness of mental representations (i.e., level of construal) and vice versa. As a first tenet, CLT proposes that psychological distance to targets of interest (e.g. events, objects, or people) arises when the target is removed from direct experience. This distancing occurs along different dimensions, that is, time, space, social, and hypothetical (Trope et al., 2007). For example, the prospect of bad weather is psychologically distant if it is expected to happen in the far future (temporal), somewhere far away (spatial), if it is deemed unlikely to occur at all (hypothetical), or if it will affect a stranger rather than a friend or myself (social). The 'or' is important here because, crucially, one dimension can by itself trigger psychological distance. However, as in this example, these dimensions often covary so that distance on one dimension may prompt distance on another (Fiedler et al., 2012).

As for the second tenet of CLT, the theory proposes that psychological distance affects the level of construal. CLT distinguishes between more low- and more high-level construals. Low-level construals are mental representations that are concrete and accentuate the detailed features of the target of interest whereas high-level construals are more abstract and accentuate only core features. When psychological distance is small, that is, the target is perceived of as being close, low-level construals play a dominant role in determining dispositions toward the target of interest whereas when the psychological distance is high the opposite is true; high-level

construals are likely to be more salient. For example, an upcoming vacation in the Bahamas will be envisaged more detailed and concretely (e.g. smell of the ocean) when it is set to happen next week and more abstractly and high-level (e.g. relaxation) when it is set to happen in six months. This is an example of different levels of construal induced via temporal dimension (Liberman et al., 2002). The basic tenets are depicted in Fig. 1.

### 2.1 Toward a construal level account of social presence

Social presence is "the psychological phenomenon in which, to a certain extent, the other persons are perceived as physical 'real' persons in technology-mediated communication" (Kreijns et al., 2022, p. 141). While there are many factors determining perceptions of social presence (e.g. Tu, 2002; Walther, 1992, 1993; Wiener & Mehrabian, 1968), in online distance education social presence is mainly affected by the psychological distance between communicating partners (i.e., students) (Hess et al., 2018; Wakslak & Joshi, 2020). According to construal level theory (CLT), a heightened degree of social presence then would result from low-level construals, generating a 'real' rather than abstract impression of the other person. On the other

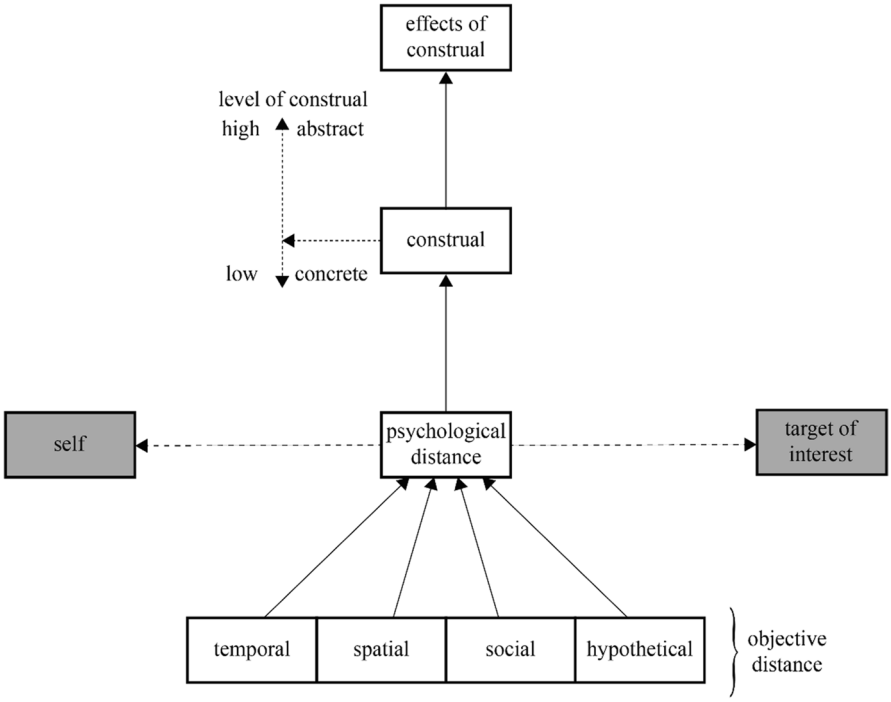


**Fig. 1** Basic tenets underlying CLT. The first tenet is displayed horizontally, whereas the second tenet of CLT can be seen vertically. Level of construal is determined by psychological distance, which itself is determined by objective distance dimensions. In this situation of relatively close psychological distance, trait details of the target of interest are more likely to be carried over to form a low-level construal

hand, temporal removal like asynchronous communication, may contribute to a more high-level construal, thus, creating a more abstract impression.

Construal level theory posits that perceived psychological distance actually alters which social cues are attended to and integrated into the overall impression of the other person. In other words, at greater psychological distance, there is a tendency to look for the 'bigger picture,' compared to a more psychologically proximal situation (Hess et al., 2018). This is plausible given findings showing that impression formation is guided by heuristics and inferential stereotyping (Fiske & Taylor, 2013). These processes appear to be amplified under psychological distal conditions. Overall, these mechanisms of construal levels and impression formation are consistent with phenomena like spontaneous trait inferences from social psychology (Uleman et al., 2008; Rim et al., 2009) as well as established theories from the field of computer-mediated communication; for instance, the hyperpersonal model of computer-mediated communication (CMC) (Walther, 1996).

Connections between psychological distance dimensions and the realities of online distance education are straightforward. Students are geographically distant from each other, that is why mediated communication is necessary in the first place (Moore & Kearsley, 2011). Moreover, this communication is commonly temporally removed, as is the case in asynchronous message board communication (Legon & Garrett, 2018). In an extension of CLT to virtual groups, Wilson et al., (2013) posit that objective distance dimensions will create a psychological distance such that psychologically distant communication partners will be perceived as homogeneous. Applied to online distance learning, it means that students would not conceive of their fellow students in the learning environment as distinct individuals. This is because temporal and spatial distance are intrinsically a characteristic of distance education and they have an obvious impact on students' feeling that they are psychological separated from each other.

With regard to the social distance dimension, online distance learners are often strangers to each other, especially at the beginning of a course or program. As shown by Liviatan et al., (2008) and Stephan et al. (2011), familiarity and similarity with others fosters more concrete, context-dependent perceptions and vice versa. This suggests that the relative anonymity of online distance learning conversely promotes distance via the social dimension of psychological distance, which in turn leads students to think in more abstract and even stereotypical terms about their fellow students (Hess et al., 2018).

Lastly, relating to the hypothetical dimension, successful and satisfying social interaction can be an uncertain prospect in many online distance learning experiences, as students at the beginning of a course may not know what to expect, and learning environments may not afford quick and seamless communication (Weidlich & Bastiaens, 2019). This psychological distance of hypotheticality further sustain abstract construals of fellow students. Given these circumstances, increased psychological distance between students in online distance learning is all but guaranteed. Of course, this observation is not new, rather a staple of decades of distance education research, occasionally termed social isolation or feelings of disconnect (Boling et al., 2012; Rovai & Wighting, 2005), captured in theoretical frameworks like transactional distance (Weidlich & Bastiaens, 2018; Moore, 2013) and, of course, social presence

(Lowenthal, 2010). Yet, by making the connection between social presence and CLT we can formulate initial hypotheses that go above and beyond what these accounts brought forth individually. See Fig. 2 for a visual summary.

**Proposition 1** *Social presence is the result of low-level construals. High-level construals of others do not allow for an experience of social presence, as the abstractness of the communication partner highlights the mediated nature of communication. Thus, a high degree of social presence implies lower-level construals of fellow students. This can be facilitated by decreasing psychological distance.*

**Proposition 2** *Psychological distance affects social presence perceptions. The externalities of psychological distance are to some extent malleable. In online distance learning, some dimensions of psychological distance are fixed by external circumstances (spatial), others can be reduced (social, hypothetical), and yet others are*

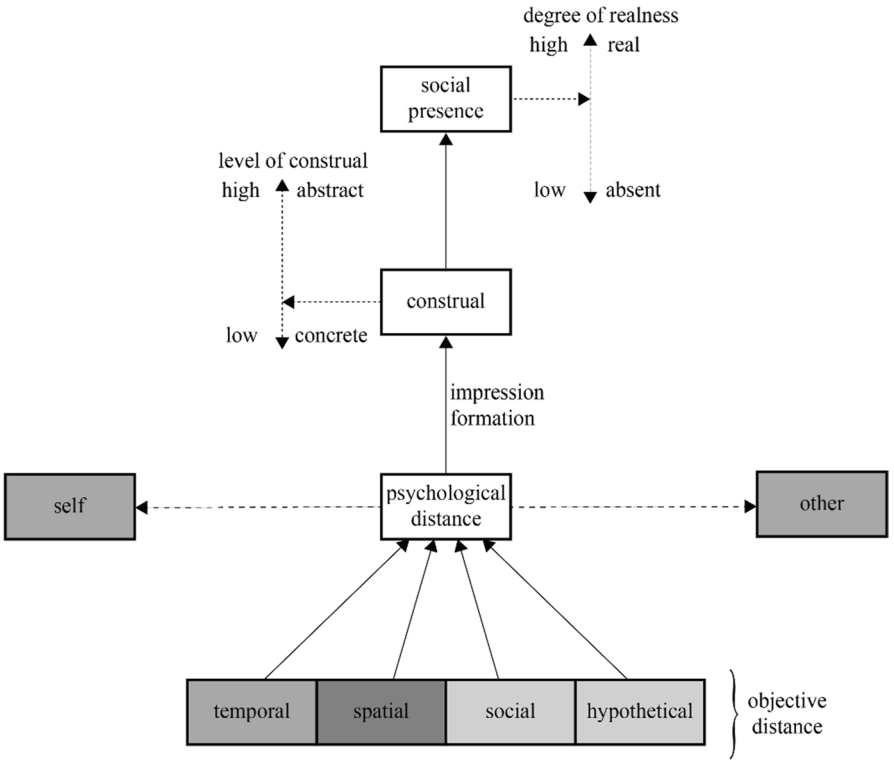


**Fig. 2** Extended propositions flow from connecting CLT with social presence in online distance learning scenarios. Fixed distance dimension (spatial) is dark greyed, potentially flexible dimension (temporal) is moderately greyed, and malleable dimensions (hypothetical, social) are light greyed. Due to relatively close psychological distance, peer construal is low-level and concrete, trait details of peers are fully carried over. Therefore, the degree of social presence is relatively high, meaning the other is real and there (i.e., present) in mediated communication

*potentially flexible*, *depending on case-by-case contingencies* (*temporal*). *Crucially*, *varying psychological distance should affect social presence perceptions*.

### 2.2 The present study

A well-documented connection between the concepts of psychological distance, construal levels, and social presence would be a major asset for our theorizing around social presence while also informing the online distance learning literature. For this reason, our main research goal is to investigate the hypothesized connections between different psychological distances and individuating impressions that students have of their fellow students.

To this end, we formulate two main research questions:

RQ1. *What are the effects of psychological distance in online distance learning on construal levels of individuating impression of fellow students?*
RQ2. *What are the effects of psychological distance in online distance learning on perceptions of social presence?*

To investigate these, we conducted a vignette-based experimental online study, with psychological distance as main experimental factor with four levels (very close, close, far, very far). Level of construal (homogeneity, generalizing) and social presence (awareness, proximity) served as dependent variables. First, we hypothesized that increasing psychological distance to a fellow student in a fictious online learning scenario will lead to more high-level, that is, abstract impression construals of fellow students, with opposite effects of decreasing psychological distance. Showing whether and how principles of CLT apply in this context provides meaningful information to better understand the psychosocial experiences of online distance learners. Further, this allowed us to conceptually replicate a fundamental tenet of CLT, whether psychological distance exerts a causal effect on construal levels. This has not been investigated in the context of online distance learning, where certain externalities of the learning context may induce psychological distance.

Second, we were able assess the causal effect of psychological distance on social presence perceptions (proposition 2), a relationship that has not yet been investigated but bears directly on research efforts to better understand predictors of student social presence, a longstanding goal in social presence research. We hypothesized that increasing psychological distance will lead to lower perceptions of social presence toward a fictious peer in the presented scenario, whereas decreasing psychological distance will do the opposite.

## 3 Method

### 3.1 Research Design

This study is a between-subjects experimental vignette study with psychological distance as independent variable and construal levels and social presence as dependent variables. Psychological distance was operationalized through three dimensions (temporal, spatial, hypothetical) with two levels each (proximate, distal). Construal levels were operationalized through two construal facets (homogeneity, generalizing) and social presence consisted of two dimensions (awareness, proximity). Vignette experiments, or factorial surveys, are characterized by typically short, systematically varied descriptions of a scenario with the goal of eliciting certain perceptions, attitudes, or preferences that arise from the presented scenario (Steiner et al., 2016). They carry the advantage of being more concrete and realistic than many conventional survey questions and, through their experimental design, yield high internal validity. Finally, research has shown that vignette experiment responses can closely match real-world behavior, thus, suggesting external validity of data obtained by vignette designs (Hainmueller et al., 2015).

### 3.2 Procedure

Students were presented with a vignette in the form of a brief scenario description. This scenario placed them as a student participating in an online class as part of their higher education degree. In the online class, students interacted with their fellow students via a text-based communication tool provided by the online learning environment:

> *"You are a student at a mid-size university that also delivers classes online. The online class you are currently visiting uses an online learning environment with common functionalities, e.g. message board, direct messaging, quizzes, multimedia learning material, etc. Reproduced below is a hypothetical text conversation, between you and a fellow student from this class."*

The vignette continues by providing additional information about the scenario and your relationship with a fellow student. These details encompassed three objective distance dimensions (spatial, temporal, hypothetical) and varied by being either relatively psychologically proximate, i.e. *close,* or psychologically distal; that is, *far* (see Table 1). We decided to focus on these dimensions, while keeping the social dimension constant by not varying the degree of familiarity with the fellow student (see limitations section for the rationale of this decision). To this end, we did not specify if and to which degree the fellow student was familiar. We chose this approach to not unduly influence the remaining dimensions.

The three distance dimensions are ordered as a 3-tuple, denoted as '(spatial, temporal, hypothetical).' There are eight possible 3-tuples with four degrees of psychological distance. For this study, we considered the following 3-tuples: (AAA) for

**Table 1** Experimental factor operationalized along three distance dimensions

| Distance Dimension | A – close | B – far |
|---|---|---|
| spatial | You learned recently that this student happens to live in your town, just a few blocks from your apartment | You learned recently that this student lives quite far away, on the other side of the country |
| temporal | The conversation unfolded over the course of a few minutes in the online learning environment yesterday afternoon. Both of you responded immediately or within a few seconds to the other's message | The conversation unfolded over the course of a few days in the online learning environment. Both of you responded within a few hours' time to the other's message |
| hypothetical | You have learned that, as part of the online course, you were assigned to doing a group assignment together with this student next week | You have no knowledge of whether you will be working with this student in the upcoming groupwork assignments of this course or not |

very close, (AAB) and (BAA) for close, (BBA) and (ABB) for far, and (BBB) for very far. Due to the asymmetry of available 3-tuples between the intermediate distances (far and near consisting of three possible configurations each) and the end points (only one possible configuration for very far and very near, respectively), we decided to utilize only four intermediate configurations, leaving out ABA and BAB). Importantly, through this selection, each distance dimension (spatial, temporal, hypothetical) is represented by two far (B) and two near (A) conditions, ensuring the robustness of each dimension in our sampling. Crucially, to actually trace back the effects to psychological distance (instead of confounding aspects), in all conditions identical social cues should be available for processing. Thus, care was taken to align word count of distance level descriptions within distance dimensions and not to introduce additional construal-related information. After the scenario description, participants were presented with a fictitious text conversation occurring in the learning environment (Fig. 3), wherein the participant stand-in initiates a conversation with a fellow student, who then admits to struggling in the online class. The participant stand-in offers help and the fellow students thanks but does not accept the offer. The scenario did not further specify how and why this contact was initiated other than the content of the first question. Here, too, the reason was to avoid introducing a confound into the scenario as constructing a more elaborate scenario is difficult without also introducing some potentially biasing information about the participant stand-in or the fellow students.

### 3.3 Measures

As dependent variables, we collected data for construal levels as well as social presence. Construal levels of individual impressions were measured via eight questions and along two facets, homogeneity and generalizing. Homogeneity (hom) is concerned with the unit-of-representation and refers to seeing a communication partner as either as an individual with salient, distinguishing features or, conversely, as a relatively nondescript member of a larger group (Wilson et al., 2013). Generalizing (gen) refers to the specificity of the information represented. In this case, relatively global, sweeping inferences about the individual represent a high-level construal, whereas more restrained, context-specific judgments represent a low-level construal (Liviatan et al., 2008). Each facet consisted of two distinct questions about the scenario and the conversation. Respondents were asked to respond to two versions of each question, one presenting a high-level construal of the vignette and the other presenting a low-level construal (Table 2).

Social presence was measured using a shortened version of the social presence scale developed by Kreijns et al. (2020). This scale measures social presence as the ‘realness’ of the other in the learning environment across two dimensions, awareness and proximity, and has shown good psychometric properties. Because many items specifically refer collaborative learning groups and actual experiences with an online learning environment, some items were not applicable to this vignette study. For this reason and for survey-economic purposes, three items

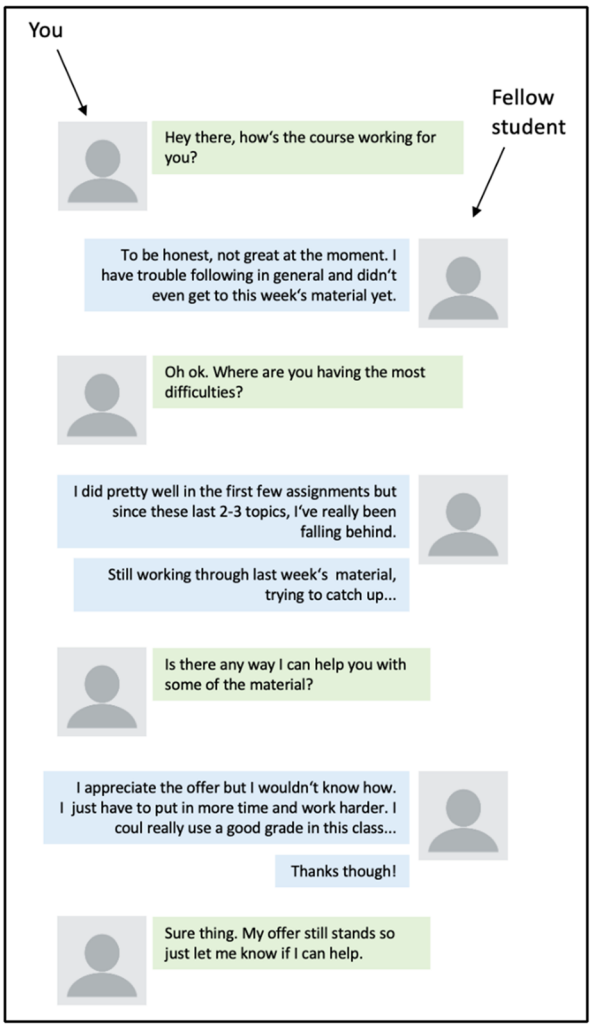


**Fig. 3** Fictitious text conversation with a fellow student, presented to all participants

from each dimension were selected, aiming for items that (a) fit the present context well, (b) are representative of the particular dimension, and (c) had displayed varied item difficulty in previous studies. For the awareness dimension, items were "I was able to form a distinct impression of this student," "This student felt like a real person and not an abstract anonymous person," and "I felt that I knew this student". Internal consistency for this dimension was Cronbach's $\alpha = 0.67$. For the proximity dimension, items were "I felt that this student was very near to me," "I was able to picture this student as if they were in front of me," and "I strongly felt the presence of this student". Internal consistency for this dimension was Cronbach's $\alpha = 0.76$. Construal levels and social presence items were measured on a 5-point Likert scale ranging from strongly disagree to strongly agree.

**Table 2** Items assessing construal level across two dimensions

| Construal facet | Level of construal | |
|---|---|---|
| | High—abstract | Low—concrete |
| hom1 | It seems that my fellow students in this class are not performing well | It seems that this student is not performing well in this class |
| hom2 | It seems that honest conversations about learning troubles are possible with this group of students | It seems that honest conversations about learning troubles are possible with this student |
| gen1 | This student struggles academically | This student struggles in this particular class |
| gen2 | This student is motivated and conscientiousness | This students is doing his best to keep up in this class |

### 3.4 Sample

Participants were recruited via Prolific (prolific.co). Sampling criteria were native-level command of English language as well as currently being enrolled at a higher education institution. We aimed for a gender-balanced sample of 160 students and paid participants an hourly wage of $11.2. With an estimated survey duration of 5 min, this amounted to paying each participant approximately $1 for their participation. We included one attention check, which no participant failed, suggesting sufficient attention to provide meaningful data. Because randomization led to uneven cell sizes initially, we recruited additional 34 participants until roughly similar cell sizes of around n = 30 were achieved ($n_{(AAA)} = 34$; $n_{(AAB)} = 34$; $n_{(BAA)} = 27$; $n_{(ABB)} = 32$; $n_{(BBA)} = 31$; $n_{(BBB)} = 36$).

Our sample of $N = 194$ participants consisted of 99 individuals identifying as male (51%), 91 identifying as female (46.9%), and four non-binary individuals (2.1%). Mean age of participants was 25 years ($SD = 5.4$), but most were 24 years of age. Cumulatively, 94.8% of participants indicated having 'a lot' or 'some experience with online learning' and, analogously, 94.8% of participants reported being 'very much' or 'somewhat able to mentally project [themselves] into the presented scenario and conversation.' From the respondents, 8.8% indicated that they knew what this study is about but only three participants provided nominally related guesses ('How connected students can feel while only connecting online,' 'the perception of someone's character based on text conversation,' 'does sharing information that seems personal make it possible to feel closely connected?'). No participant mentioned social presence or construal level theory, suggesting that they were unaware of the study goal. Because it was between-subject design, participants were further unaware of the existence of experimental conditions, increasing our confidence that this design does not elicit a large degree of social desirability in responses.

### 3.5 Analysis

To investigate the effects of induced psychological distance on levels of construal (RQ1), we began by plotting dependent variables as a function of experimental groups and inspecting patterns on a descriptive level. We collapsed 3-tuples with identical psychological distance; thus, the 3-tuples (AAB) and (BAA) were collapsed as they both indicate *close*, and (ABB) and (BBA) were collapsed as they indicate *far*. Collapsing was warranted here because the unique contributions of distance dimensions are not central to the replication of these general effects in the realm of online distance learning. Rather, it is the total degree of psychological distance that was of interest here. At this descriptive level, construal item pairs were analyzed individually. For testing the statistical significance of observed patterns, however, item pairs were integrated into a measure of *relative construal* to avoid unnecessarily doubling the number of statistical tests and thereby increasing the familywise error rate. Effects were assessed statistically by using dummy-coded distance dimensions as predictors in multiple regression models, one for each social presence dimension as the dependent variable.

Multiple regression was used to obtain an estimate of the explained variance of the model while dummy coding was used due to psychological distance being a categorical variable with four levels. This makes it necessary to recode these variables into numerical values 0 and 1. Sensitivity analysis using G*Power (Faul et al., 2007) for F tests (i.e., ANOVA, fixed effects, omnibus) with alpha level of 0.05, desired power of 0.8, sample size of 194, and four groups resulted in a smallest detectable effect size of $f = 0.24$, a medium-sized effect according to Cohen (1988).

Assessing the effects of psychological distance on social presence perceptions followed a similar approach. To further tease out which objective distance dimensions were particularly consequential for social presence, these analyses were complemented by a more in-depth look at the unique contributions of distance dimensions, i.e. plotting all six conditions individually. These analyses (linear multiple regression, fixed model, single regression coefficient) were powered to detect $f^2 = 0.04$, a small effect according to Cohen (1988).

## 4 Results

To address our first research question, we first plotted high versus low construal responses against four degrees of psychological distance (Fig. 4). Results showed that under conditions of psychological closeness, participants tended to endorse low-level construals over high-level construals. This preference for more individuating,

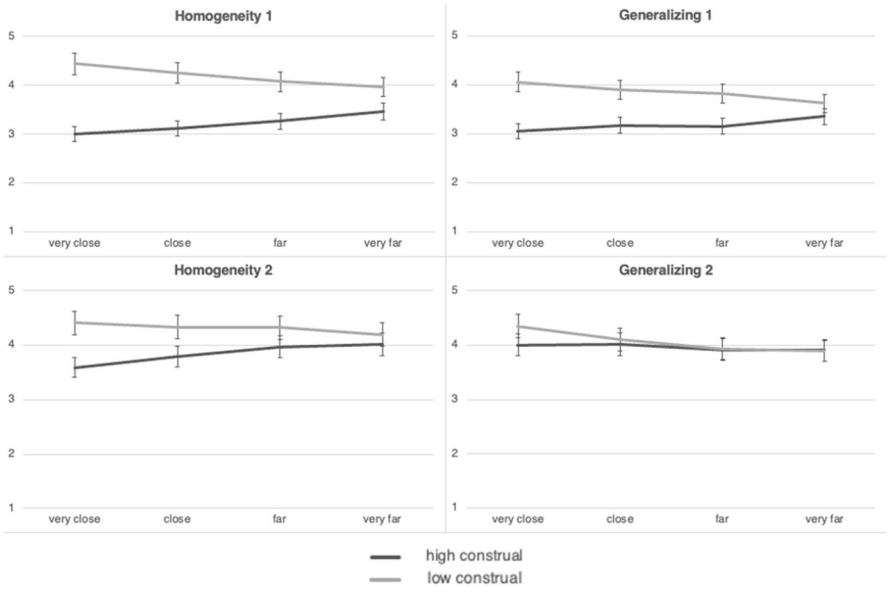


**Fig. 4** Levels of construal as a result of degrees of psychological distance, with 95% confidence intervals

concrete representations of the fictitious conversation partner decreased monotonically with increased psychological distance, whereas high-level construals were relatively more favored under psychologically distance conditions. In the case of two items (Gen1 and Hom2), this resulted in an overlap of confidence intervals at the highest psychological distance, indicating that participants no longer favored low construals over high construals. In regard to item Hom1, we found that even in the most psychologically distant conditions participants still favored low-level construals. For Gen2, only in the most psychologically close condition, there was a preference for low-level construals, with the other conditions showing nearly identical construal preferences.

To assess the statistical significance of these differences via the General Linear Model, we needed to collapse the item pair of each construal facet into one dependent variable. To do this, we subtracted values of the high-level construals from those of low-level construals to construct four indicators of *relative construal* (ΔH1, ΔH2, ΔG1, ΔG2). Here, higher values indicated a stronger relative preference for the low-level construal. These were then entered as dependent variables into model, while psychological distance conditions were entered as factors. Results showed significant effects for three of the four items tapping construal levels, with overall larger effects on homogeneity perceptions and smaller effects on generalizing perceptions (Table 3). This replicated a main tenet of construal level theory, the impact of varying psychological distance on interpersonal perceptions, and extends it to the realm of online distance learning with regards to construal levels of individual impressions of fellow students.

To establish the hypothesized connection to social presence perceptions, as formulated in our second research question, it is necessary that varying distance dimensions would also lead to differing degrees of social presence perceptions of fellow students. This is plotted for both social presence dimensions in Fig. 5. The graphs show an increase of both social presence perceptions with reduced psychological distance and vice versa. These effects are relatively large and statistically significant as evidenced by significant models and effect sizes larger than those of the effects on construal levels (Table 3). There were no statistically significant interactions with gender nor age of participants.

**Table 3** Statistics for the effects of psychological distance on relative construal

| | $R^2$ | F | very close – very far | close – very far | far – very far |
|---|---|---|---|---|---|
| Construal facet | | | | | |
| ΔH1 | 0.113 | 8.11*** | 4.45*** | 3.48*** | 1.67 |
| ΔH2 | 0.056 | 3.77* | 3.16** | 2.05* | 1.09 |
| ΔG1 | 0.056 | 3.73* | 3.30** | 2.30* | 2.03* |
| ΔG2 | 0.016 | 1.03 | 1.58 | 0.61 | 0.25 |
| Social Presence | | | | | |
| Awareness | 0.190 | 14.83*** | 5.92*** | 5.76*** | 4.05*** |
| Proximity | 0.114 | 8.15*** | 3.74*** | 2.22* | 0.22 |

*Note.* *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

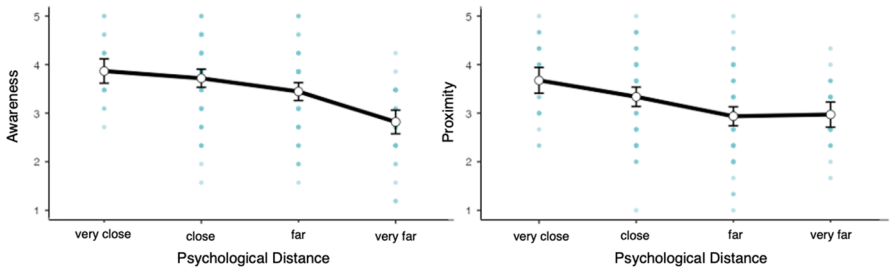


**Fig. 5** Social presence perceptions as a function of psychological distance, with 95% confidence intervals

To assess whether any of the three psychological distance dimensions were particularly impactful with regards to social presence, we further analyzed the effects of each of the six conditions separately, instead of collapsing middle conditions into close (the 3-tuples (AAB) and (BAA)) and far (the 3-tuples (BBA) and (ABB)). Results suggested a largely monotonical decrease of social presence perceptions as a result of increased psychological distance (Fig. 6). For awareness, the pattern clearly aligns with the degree of total psychological distance, in that (AAB) and (BBA) as well as (ABB) and (BBA) conditions produce similar social presence perceptions. For proximity, this pattern is slightly different in that conditions with identical degrees of total psychological distance still resulted in diverging social presence perceptions, suggesting that distance dimensions may exert unique effects. Notably, the most distant condition (BBB) did not lead to the lowest social presence perceptions, but instead the condition that was temporally and spatially distant, but close on the hypothetical dimension (BBA). Furthermore, it appeared that the hypothetical distal conditions, (AAB), (ABB), and (BBB), resulted in relatively high degrees of social presence, which is against expectations and in stark contrast to the effects of this distance dimension on awareness.

These observations are supported by significant regression coefficients of all three distance dimensions for awareness but not for proximity. For the proximity dimension of social presence, only temporal distance was a statistically significant predictor (Table 4).

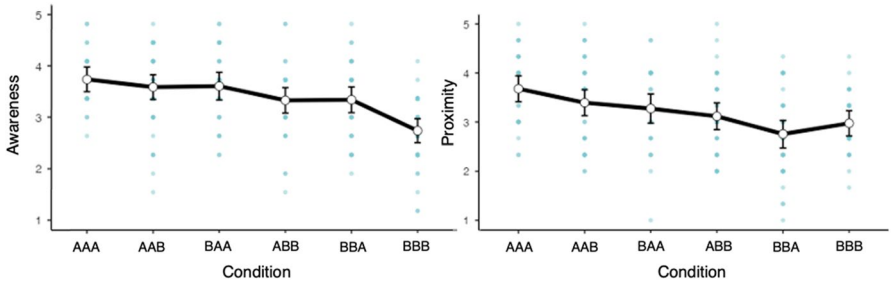


**Fig. 6** Social presence perceptions as a function of experimental conditions, with 95% confidence intervals

**Table 4** Effects of individual distance dimensions on social presence

| | Awareness | | | Proximity | | |
|---|---|---|---|---|---|---|
| | Estimate | SE | t | Estimate | SE | t |
| spatial | 0.34 | 0.12 | 2.9** | 0.27 | 0.14 | 1.9 |
| temporal | 0.24 | 0.12 | 2.0* | 0.39 | 0.14 | 2.8** |
| hypothetical | 0.35 | 0.11 | 3.1** | 0.04 | 0.14 | 0.26 |
| Model | $R = 0.41$; $R^2 = 0.17$ | | | $R = 0.40$; $R^2 = 0.12$ | | |

*Note.* *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

To ensure the robustness of these results, we repeated these analyses on the subset of students indicating a large degree of experience in online learning ($n = 142$) and those participants indicating that they were very much able to project themselves mentally into the scenario ($n = 124$). The results remained analogous with similar or slightly larger effects, suggesting that outliers did not drive our main findings.

## 5 Discussion

Social context is pivotal to understanding interpersonal processes in online distance learning as the sudden rise of emergency remote teaching due to Covid19 (Bond et al., 2021; Hodges et al., 2020), highlighted the psychological distance induced by this learning mode. As a main finding of this study, we were able to show that temporal, spatial, and hypothetical distance can induce high-level construals of conversation partners and, as a consequence, decrease perceptions of social presence. These novel findings lend support to what online distance learning practitioners and researchers have known for decades: that learning at a distance brings about a particular set of psychosocial challenges (Weidlich & Bastiaens, 2018; Gunawardena, 1995; Lowenthal, 2010; Moore, 2013). Considering the role of social presence in online distance learning, these findings highlight the importance of strategies to mitigate this psychological distance, facilitating more meaningful and effective interactions.

But as we also know from decades of research into social presence, this distance can be overcome and is overcome routinely. Converging lines of research have shown that social presence is *relational* (Walther, 1996; Kehrwald, 2008). With time, students can experience high degrees of social presence, even in the leanest of communication modes like text-based asynchronous conversation, as first shown by Gunawardena (1995) and incorporated in Walther's social information processing theory (1992, 1993). Moreover, learning environments can be more or less *sociable*, that is, provide affordances for social interaction (Weidlich & Bastiaens, 2019), which in turn, reduce psychological distance via the temporal and hypothetical dimension. Our findings suggest that akin to a dose–response relationship, each lever to reduce psychological distance provides additive benefits toward inducing lower-level construals and, thus, further enhances social presence. This implies that

although some distance-inducing features of online distance learning scenarios may be non-negotiable, carefully designing other more malleable properties to reduce psychological distance would still be worthwhile.

Our findings add theoretical support for the effectiveness of techniques to establish social presence, as discussed by Lowenthal and Dunlap (2018). Among the top-rated techniques were "previous relationships with peers" (Table 4, p. 11). In light of the theoretical integration provided here, this is attributable to low psychological distance on the social dimension. Techniques reducing temporal distance, such as "threaded discussions" and "synchronous sessions" (Table 4, p. 11), were also perceived as beneficial for enhancing social presence. Viewing social presence perceptions as the outcome of low-level construals illustrates that many strategies to enhance social presence in educational practice may actually operate by reducing one or more psychological distance dimensions. This offers researchers and practitioners a framework to develop and explore new approaches to enhance social presence. Particularly, the hypothetical dimension of psychological distance, which significantly impacts the awareness dimension of social presence, is an area worth exploring. As shown by Walther (1994) for CMC, the anticipation of future, ongoing interaction can positively affect interpersonal perceptions. A potential intervention to enhance social presence for online distance learning contexts could involve informing students at the course outset about future collaborative learning tasks and partners, backed by a continually updated plan of upcoming activities and group configurations displayed prominently in the course environment. For enhancing the proximity dimension of social presence, strategies focused on reducing temporal distance may prove most effective.

In terms of theory development, our findings support the integration of heretofore disconnected accounts of (interpersonal) mental representations. For social presence theory, the alignment with a long-established and comprehensive account like CLT is an important touchstone, as our inclination to automatically respond to social cues and generate mental representation of other actors cannot be unique to mediated settings (Biocca et al., 2003). This grounding lends further credence to the validity and utility of social presence as an insightful account pertaining to interpersonal perceptions in online distance learning. Coupled with recent efforts to solidify social presence theory through construct definition (Lowenthal & Snelson, 2017; Kreijns et al., 2022), rigorous measurement (Kreijns et al., 2020), and exploring antecedents, mechanisms, and effects (Weidlich, 2021), we affirm the concept's analytical strength. In other words, we reject the idea of "killing" the concept of social presence for its shortcomings, as per Öztok and Kehrwald (2017)'s proposal. From further probing, more testable implications can emerge, with implications for online distance learning research and practice. To make these findings more relevant for educational practice, these effects should be investigated in relation to different learning designs.

## 6 Limitations

A limitation of this work is that short vignettes were the basis for experimental treatment. This means that the process of impression formation was based on a rather limited amount of information. Actual student–student communication more likely consists of multiple conversations over time, with accumulated messages creating increasingly detailed impressions of fellow students. In addition, other, non-discussion information may also contribute to impressions that become more detailed over time, for example, how active a fellow student is in the learning environment (Weidlich & Bastiaens, 2022), such that, overall, longer treatments will likely result in relatively lower construals (Gunawardena, 1995; Walther, 1992, 1993). It remains an open question whether the effects of distance dimensions remain relevant over more realistic treatment durations, i.e. semester-long courses.

Further, the communication scenario was rather bare-bones, in that no pictures, emoticons, or other social cues embellished the conversation and allowed for more individuating impressions. This was intentional not to create an effect that would confound our experimental treatment. However, actual conversations among students may look rather different, thus possibly limiting the generalizability of our findings.

Due to the large conceptual overlap between the social dimension of psychological distance and social presence, our design omitted the social distance dimension as experimental treatment. We worried that this overlap would make an unconfounded experimental manipulation particularly challenging and, given that this study is but a first exploration into the connection of psychological distance and social presence, we decided that a focus on the remaining three distance dimensions was defensible at this time. Ultimately though, future research should strive to tease apart how social distance dimensions relate to social presence perceptions. In fact, given the conceptual overlap, social distance may prove to be a particularly powerful lever to enhance social presence perceptions.

## 7 Conclusions

Due to its relevance for understanding human interaction in technologically-mediated spaces, social presence is an evocative and heavily researched phenomenon. At the same time, it is an elusive construct, which, almost half a century after its first appearance in the literature, is still insufficiently understood, as demonstrated by many calls to action (Lowenthal & Snelson, 2017; Biocca et al., 2003; Öztok & Kehrwald, 2017; Kreijns et al., 2022). We argue that tying social presence to broader theories of mental representation, like construal level theory, may provide the grounding for more robust and systematic research. More narrowly, the findings of this study yield insights into how typical characteristics of online distance learning constitute forms of psychological distance and this affects how students perceive their communication partners, with possible downstream effects on how social interaction and collaboration unfolds. Given the crucial role of social interaction in

learning scenarios, particularly in computer-supported collaborative learning, we hope this research is seen as a starting point for more research into the relations of psychological distance with social presence in various educational settings.

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**Data Availability** Data will be made available on request.

## Declarations

**Competing Interests** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**Informed Consent** Study participants provided informed consent to participation in the study as well as publication of the results in an academic publication.



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