

NAVIGATING VIRTUAL SPACES:
SPATIAL LANGUAGE AND COGNITION IN A VIRTUAL WORLD

by

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Navigating Virtual Spaces: Spatial Language and Cognition in a Virtual World

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The concept of three basic frames of reference to describe spatial relations has taken firm root in linguistics and cognitive science over the past twenty years. Levinson contends that speakers of a particular language tend to use the frames of reference predominant in that language to solve nonlinguistic spatial tasks – in short, in the domain of spatial reference and reasoning, language can be shown to influence cognition. I examine data taken from the spatial language that players use to navigate the virtual world of the popular MMO World of Warcraft, and attempt to demonstrate that many factors other than native language are responsible for the spatial systems used to address different situations. These factors, including the availability of time to formulate precise directions and the availability or lack of certain paralinguistic tools, may outweigh the influence of native language in determining which system of reference to use.

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Space is one of the most basic semantic domains; like kinship or time, it is one of the most fundamental aspects of human existence, requiring all languages to adopt some method of partitioning and discussing it. Given the diverse forms that these methods can take, the typology of linguistic spatial strategies – perhaps unsurprisingly – has been fraught with much lively debate. Einar Haugen (1957) introduced the peculiarities of spatial orientation terms in Icelandic by holding them up as a vexatious problem for the demands of strict “scientific accuracy” in the study of semantics. Four decades later, Stephen Levinson (1996b) attacked the belief that languages generally assign spatial terms along the lines of the strategies used by Indo-European languages: a body-centered Cartesian system with the viewer or speaker as a mobile origo. Levinson introduced the currently prevalent view that there are three prominent systems for describing angular relations, or *frames of reference*, from which the languages of the world commonly choose. He further claimed that if a language prioritizes one of these frames of reference over the others, its speakers will naturally default to this frame of reference when solving non-linguistic spatial tasks. This neo-Whorfian claim quickly grew popular, if not downright notorious. It was tested and supported again and again by subsequent studies; the influence of language seemed to outweigh every other factor in determining which spatial strategy speakers would favor – at least in experimental conditions.

The purpose of this paper is to demonstrate that, outside of formal experimental conditions, speakers may be influenced by a variety of factors other than native language in deciding which spatial systems to use. It may be difficult, as Li and Gleitman (2002) among others learned, to set up an experimental situation that will induce speakers to shift away from

the frames of reference that their language favors. However, virtual worlds offer endless possibilities for emulating or altering the parameters present in the real world, making them a valuable resource for modeling trends in a wide variety of disciplines. Here I examine the structure of the virtual world of Azeroth, the setting for the popular online game World of Warcraft, in order to then present and explain the trends which inhibit its players from using the frames of reference which their native language should encourage them to use in candid speech to each other. I provide examples of the spatial strategies which players prefer instead, and discuss why these strategies more adequately fulfill the players' conversational needs.

Background

Levinson and Frames of Reference

Levinson (1996a) succinctly summarized the difference between the three frames of reference when describing where one object of interest (the *figure*) may be in relation to another (the *ground*). The Intrinsic system utilizes features or axes of the ground as its landmarks, as in “the ball is near the teapot's spout”. The Relative system uses angles derived from the viewer's body coordinates, as in “the ball is left of the teapot”. Finally, the Absolute system uses fixed bearings such as cardinal directions, as in “the ball is north of the teapot”.

Levinson's ethnographic work with speakers of Tzeltal Mayan undermined the notion that the world's languages must prioritize the Relative frame of reference because it is body-centered and therefore must be more “natural” – a notion that was influenced by a heavy bias towards Indo-European languages in early linguistic study (Levinson, 1996b, p. 358). Although Tzeltal does have a detailed Intrinsic system, its use is limited to describing “objects in strict contiguity”

(Levinson, 1996a, p. 111). Instead, the predominant Tzeltal frame of reference is the Absolute system, though it is not precisely based on the classic cardinal directions. The Tzeltal-speakers whom Levinson studied take their bearings from the topography of their home, the mountainous Tenejapa region, with *uphill* approximately to the south and *downhill* to the north. A single transverse term refers to both east and west. Despite these names, the system is a true, abstract fixed-bearing system; Tenejapans are able to keep mental track of these directions and apply them readily even when they are unable to see the landscape or when they leave their home area.

Because Tzeltal has no Relative system, it lacks any terms that might gloss into English as *left/right/front/back*; Tenejapans refer instead to one's uphill arm or a cup that is downhill of a plate. The lack of any Relative terms whatsoever led to Levinson's rejection of not only the idea of a “natural” predominance of the Relative system, but also the idea of any single innate, cross-language spatial system with a full-fledged set of semantic features which only require language-specific names. He contended instead that language influences thought in the case of spatial categories – that a language will prioritize one or more frames of reference, and that these will also be the most natural frames of reference for the speakers of this language to use in nonlinguistic spatial tasks.

To demonstrate this, he introduced the now-classic array reconstruction task, an experiment designed to reveal unambiguously which frame of reference the participant uses for a nonlinguistic spatial task. The design of the task is simple and elegant. The subject sits facing a table upon which a row of animal figurines stands (for example) all facing to the subject's right, which is also north. After some time to study and remember the array, the subject is turned 180 degrees to another table and asked to reconstruct the array. A subject who consistently arranges

the animals to face north (and left) would demonstrate reliance on an Absolute frame of reference, while a subject who lines up the animals facing right (and south) would be classified as using the Relative frame of reference. Although Levinson designed and carried out two other experiments with the same underlying structure – a card-matching task and a transitive inference task – the array reconstruction task is the only one which is extensively replicated by later researchers.

Levinson (1996a) performed these three experiments with two populations, one made up of native speakers of Dutch, a primarily Relative-biased language, and the other of Tenejapans. The instructions in each case were carefully worded to prevent encouraging one system of reference over another: “Remember just how it is”, “Remake the array just how it was”, and similar statements (p. 114). As Levinson predicted, the overwhelming majority of the Dutch speakers were consistent Relative coders in all three trials. Tenejapans were mostly Absolute coders, but lacked quite as much consistency. Levinson attributed this lack of consistency to two factors: the unfamiliarity of such a structured task, and the lack of a distinction in Tzeltal between east and west. To confirm this, he recalled the Tenejapans to repeat the experiments on the orthogonal axis, and the majority of the errors did indeed occur on the east-west axis (p.123).

Levinson presented the results of these experiments as clear evidence that the nonlinguistic spatial coding of each group is consistent with the coding built into their respective languages. This “holds across different psychological faculties: the ability to recall spatial arrays, to recognize those one has seen before, and to make inferences from spatial arrays” (p. 122-3). He took pains to demonstrate that the tasks were truly testing nonlinguistic capabilities; to avoid the possibility of a linguistic confounding factor, such as subjects subvocalizing to help with

recall, he designed two additional experiments. The first was a more difficult version of the array reconstruction task, with more items, some of which had complex asymmetries, placed in a nonlinear configuration. Tenejapans could duplicate these arrays on an Absolute frame, mentally rotating the figures to envision and place them correctly from the other side, and even imitating the angles and distances between figures to a remarkable degree (p. 123-4). The second was a task that involved showing each subject a cartoon that involved action from (as the monitor was placed) east to west. The subject was then moved to another room and asked to retell the story of the cartoon once when facing north, and again when facing south. The Tenejapans' spontaneous gestures while recounting the story in each case tended to imitate the Absolute orientation of the motion in the cartoon, e.g. east to west rather than left to right (p. 124). Since linguistic mnemonics are unlikely to contribute meaningfully to either of these tasks, Levinson concluded that the experiments successfully test nonlinguistic spatial coding, and that they support the Whorfian hypothesis that a language's preferred frame of reference will influence if not outright determine its speakers' default nonlinguistic frame of reference.

Levinson's work was followed by a flood of others who elaborated upon, confirmed, or contested his ideas. Pederson et al. (1998) replicated Levinson's experiments with speakers of thirteen languages, ten of which are spoken by small-scale and often nonliterate communities (p. 559). They conducted an exercise dubbed "man-with-tree", wherein one participant describes the spatial relations between a man and a tree in a photograph in order for another participant to identify the picture's duplicate; the rich body of linguistic data that this experiment produced facilitated the categorization of languages by their preferred frames of reference. Pederson et al. then administered the array reconstruction task to speakers of the three predominantly Absolute

and the two predominantly Relative languages. They found similar general results to those of Levinson, although they were surprised to find that ten of their subjects had settled on a different strategy: “five Arrernte, three Longgu, and two Dutch speakers were excluded from the final analysis because they showed a recall pattern with invariant orientation on every trial (for example, always facing the animals toward the window) – regardless of the original facing-direction on the presentation table” (p. 579). Pederson et al. termed these participants “monodirectional subjects”, although it is unclear from the limited information about the setup of their room whether this might not have been an Intrinsic response instead.

Majid, Bowerman, Kita, Haun and Levinson (2004) presented a survey of languages around the world and their corresponding preferences for systems of reference, in order to demonstrate that the Relative frame of reference is not typologically or innately privileged in any way over the others. Of the twenty languages studied, only nine used the Relative frame of reference as a primary spatial system; six languages did not use Relative coding at all and an additional three used it only in very limited circumstances. In contrast, fourteen languages used Absolute as a privileged spatial system, and none of the languages lacked it entirely. Similarly, the Intrinsic system was used regularly or even preferred by nineteen of the twenty languages. By this account, the Relative frame of reference is actually the least typologically privileged of the three. Nor does the Relative system seem to possess any special advantage in terms of speed or ease of learning. Children learning a Relative language produce Intrinsic uses of “front” and “back” first at around four years of age, then Relative uses of “front” and “back” at five; “left” and “right” are not reliably produced until much later, at age eleven or twelve. Children learning an Absolute language “acquire the relevant linguistic expressions just as early as children

learning a Relative language – possibly even earlier” (p. 112).

Majid et al. explored some possible reasons why languages might prefer one frame of reference over another, including the physical environment of the speakers, differences in habitual actions, and global cognitive styles such as individualism versus collectivism. None of these factors appeared to determine the frame of reference in the twenty languages investigated. In addition, they mentioned several cognitive mechanisms which might account for the Whorfian effects that Levinson promoted.

One of these possible mechanisms, perceptual 'tuning' of attention, was also discussed by Kemmerer (2006) in his survey of neuropsychological studies of the spatial capabilities of patients with brain damage. Kemmerer summarized the findings as indicative of at least a partial separation between linguistic spatial categorization and spatial distinctions encoded for non-linguistic perceptual and cognitive purposes (p. 10). He pointed out, however, that language may still exert some level of influence over nonlinguistic spatial categorization by decreasing the level of sensitivity to categorical distinctions not encoded in a speaker's native language, and increasing sensitivity to those which are.

Haun, Rapold, Janzen and Levinson (2011) investigated a potential flaw in the soundness of Levinson's claims of a Whorfian effect. The open-endedness of the instruction “Make it the same” given in Levinson's original tasks might have allowed for several available cognitive strategies, and participants may have merely followed whichever one was dominant or accepted in their culture. As Haun et al. put it, they now needed to test for “preference vs. competence” (p. 73); simply because a subject *did* not use a given cognitive strategy does not mean they *could* not, and the researchers had to tease these possibilities apart. They decided to use elementary

school children as subjects, because “in their first years of schooling children have not yet diverged to the extent that adults of different groups may have” (p. 74). The researchers began by replicating the array reconstruction task with a group of Dutch children and a group of children who spoke ≠Akhoe Hai//om, a Namibian language favoring the Absolute frame of reference. Predictably, the Dutch children produced mostly Relative arrays, and the Namibian children produced mostly Absolute arrays. The next task increased the number of items in the arrays in order to reduce the likelihood of relying on subvocalization for memorization; as in Levinson (1996a), this did not change the results. In the third experiment, however, the researchers explicitly instructed the children to use a method that they would usually not use – the Dutch children were instructed to use an Absolute bearing, and the Namibian children were instructed to use a Relative bearing. Both languages do possess terms for these secondary systems, although they are not used as extensively; through the use of repeated training trials the researchers made sure that the directions were clear and that the children understood their tasks. Despite these precautions, both groups performed much more poorly, with only one fifth of the children successfully switching to the target strategy. A few children from each group even produced Intrinsic arrays (p.78), using their school building as a landmark (p. 73). To ensure that the errors were not caused by the process of switching between frames of reference rather than the target frame of reference itself, Haun et al. conducted one more experiment. One group of Namibian children was trained in reconstructing an array using the Relative frame of reference and then instructed to switch to Absolute, while another group switched from Absolute to Relative. Once again, the group using the Absolute frame of reference was more accurate; the process of switching had no effect on performance.

Haun et al. concluded that mere cultural norms do not determine a speaker's choice of frame of reference; rather, their language affects which one will be easiest to use. They claimed that “this correlation is fully robust by age 8” (p. 79), which brings up an interesting question. The mean age of the participants in each of the four experiments was around eight or nine years old, far less than the eleven or twelve that Majid et al. posited as the final stages of cognitive spatial development. Haun et al. did not comment on the possible cognitive complications of studying a young population. Nor did they address alternate theories that their study might engender, such as the possibility that language might only affect the order in which speakers learn different spatial systems and not the extent of their mastery as adults.

Opposition to the Whorfian implications of Levinson's hypothesis came most prominently from Li and Gleitman (2002), who attempted to demonstrate that speakers of a given language – in this case, English-speaking university students – could be influenced by specific situational or environmental cues to adopt one frame of reference over another. They began by administering a version of Pederson et al.'s “man-with-tree” task to ensure that their subjects were mainly Relative coders. Then they conducted several variations of the array reconstruction task, varying the available environmental stimuli but keeping the instructions a neutrally-worded “Make it the same”. Of particular note here is the fact that some of the subjects asked for clarification of the instructions, a rare occurrence in previous experiments with “traditional populations” (p. 278). In each case “[t]he experimenter blandly responded “Just make it the same” and, improbably enough, the subject then always said 'OK' and carried out the task” (p. 276). These incidents were recorded as part of the researchers' data.

The first of these variant array reconstruction experiments tested for the possible

influence of external landmarks. One subgroup was tested in a nearly featureless laboratory room; another subgroup was tested in the same room but with the blinds of the windows all along one wall opened so that students could see the university library outside. The last subgroup was tested outdoors in an area ringed by prominent buildings. In the first condition, predictably, most of the subjects produced Relative arrays and there were few questions about the instructions. In each of the other two conditions, however, Li and Gleitman reported that subjects exhibited a nearly even split between Relative and Absolute tendencies in their arrays; seventy percent of these subjects asked for clarification (p. 278).

The second variant attempted to construct an artificial landmark which subjects might subconsciously use to orient themselves. A symmetrical toy, dubbed the “kissing ducks”, was placed at the southern/right end of the first table, well away from the array that the subjects were to memorize. An identical toy was placed on the second table, either on the southern/left end, thus likely to induce an Absolute response, or the northern/right end, thus likely to induce a Relative response. The kissing ducks were not touched or remarked upon during the task (p. 281). Nevertheless, the toy's presence influenced the subjects' choice of frame of reference; sixty percent of the first group exhibited a consistently Absolute response and eighty percent of the second exhibited a consistently Relative response. Li and Gleitman interpreted the results of both sets of experiments as support for subjects' propensity to draw upon external reference points to shift subconsciously from one frame of reference to another. If the shift between a favored and a disfavored frame of reference can be so easily induced, they argued, there is little reason to believe that language exerts much of an influence at all.

Levinson, Kita, Haun and Rasch (2002) disagreed with Li and Gleitman's interpretations.

They alleged first that the changes that Li and Gleitman made to the basic task (changing the number of animals in the array, swiveling participants in their chairs rather than requiring them to walk across a room) made the purpose of the experiments too transparent, causing the participants to ask for clarification of the directions and second-guess the experimenters' intentions. Second, they asserted that Li and Gleitman's landmark-influenced 'Absolute' results were actually not Absolute at all. “True absolute systems have nothing to do with landmarks – the geometry of such systems does not consist of lines converging on a landmark, instead it has infinite parallel lines constituting an abstract 'slope' across an environment” (p. 172). While geographical landmarks like a mountain or a river might be part of a system which can be abstracted into Absolute bearings, the small, movable kissing ducks were more likely seen by participants as part of the larger array to be reproduced – in short, encouraging an Intrinsic system. “So what Li and Gleitman actually tested,” Levinson et al. concluded, “was whether they could bias participants between the two frames of reference predominantly used in English, namely the intrinsic and the relative, and they found they could. We would never have doubted that they could do so” (p. 174). To make the point final, they replicated the “kissing ducks” experiment, but they rotated the second table 90 degrees from the first rather than 180 degrees, in order to separate possible Intrinsic from possible Absolute responses. Their results showed no true Absolute responses (p. 177).

Levinson et al. finished by reiterating the crucial features which distinguish a landmark-inspired Absolute system of reference like that of Tzeltal from an Intrinsic system which uses concrete landmarks such as prominent buildings. Unlike landmarks, which can be reached and walked around, the bearings of an Absolute system are fully abstracted and cannot be reached. In

addition, landmarks are only relevant to navigation when the speaker is in the immediate vicinity of a particular landmark, while speakers of Absolute languages are able to use their mental compass points immediately and effortlessly in all of their everyday spatial computations, from describing the relation of two objects on a table to maintaining a sense of a “downhill” cardinal direction when nowhere near a slope. This is a cognitive ability that speakers of languages that do not prioritize an Absolute frame of reference do not generally possess. There is nothing strange about how language can have such an effect on cognition, Levinson et al. maintained. “To drive a car, you need to acquire new motoric and cognitive skills. To speak Tzeltal [...] you'll constantly need to maintain a mental compass, since 'downhill' denotes a quadrant based on c. N 345°, for without that notion you can't describe where anything is” (p. 185).

But what if adult speakers already steeped in a language that does not favor the Absolute system were given just such an ability: an infallible, prominent and ever-present nonmaterial compass oriented to a set of fully abstracted bearings? How would it affect their choice of spatial frame of reference when speaking to each other? Can spatial cognition, or an augmentation to spatial cognition, overpower the effects of spatial language? These may sound like impossible hypotheticals, but in fact the ability to investigate them lies within easy reach.

Massively Multiplayer Online Games

Massively multiplayer online games, or MMOs, are a class of video games which share several common features. By definition MMOs are played online, requiring a constant Internet connection to the developing company's servers. Unlike single-player video games, MMOs feature persistent worlds, which cannot be reset or restarted by any individual player but remain

running, hosted on the company servers, even when no players are present. Players create characters or avatars through which to experience the world, often with the option to customize their name, appearance, and basic abilities. The servers keep track of the actions and progress of characters; for example, a character who obtains a rare item and logs out in a particular location will reappear in the same location and retain that item when the player next logs in, regardless of the length of time between play sessions. One server may host hundreds or thousands of people from all over the world at once, whose characters can see and interact with each other. Social interaction is often a primary focus of game design, and MMOs may incentivize players to buy and sell virtual items to each other, work together to defeat monsters, or battle each other. Players may form temporary *groups* or semi-permanent organizations, often called *guilds* or *clans*, to facilitate communication and teamwork. Due to this social emphasis, in addition to the open-ended, exploration-focused nature of the persistent worlds, there is often no clearly defined “end” to the game.

MMOs quickly grew to become quite a formidable force in gaming culture directly after the turn of the twenty-first century. In 2001, Edward Castronova wrote that the virtual economy of the world of EverQuest was the 77th largest in the real world, with a gross national product per capita between those of Russia and Bulgaria (as cited in Steinkuehler, 2006, p. 40). Steinkuehler (2006) described Lineage I and II, the MMOs she studied, as “claiming more than 4 million concurrent subscribers or roughly half the MMOGaming market” (p. 41). Just a handful of years later, Thorne, Black and Sykes (2009) reported that World of Warcraft alone had an active player base of over fourteen million people (p. 808). The genre has declined somewhat in popularity, but as of July 2014 World of Warcraft still dominates the MMO scene with over one billion

dollars of revenue and 36% of the market share; the second-place game, Lineage I, trails far behind with just 9% of the market share (Tassi, 2014).

The simulated worlds of MMOs provide unique opportunities for modeling or researching systems that parallel trends in the real world. Academia has looked to MMOs for insights into everything from economic trends (Bainbridge, 2007) to vector transmission patterns in epidemiology (Balicer, 2007).

Linguistic research on MMOs. MMOs appear to be a particularly fruitful area of study for linguistics, perhaps due to the relative ease of gathering data, or perhaps because this data can be analyzed for its own sake as well as for modeling purposes. Steinkuehler (2006) examined a rather mundane utterance from a Lineage player and analyzed it extensively on multiple linguistic levels to show how it reconstructs and represents the rich social context of the game. Thorne, Black and Sykes (2009) highlighted the benefits of MMOs as well as niche Internet interest communities as potential aids for second language learners. They presented a series of case studies of people who, through encounters which were made possible by the multinational and multicultural nature of these online activities, either had their interest sparked in learning a second language or were given the tools to independently pursue second language learning. Thorne, Black and Sykes encouraged consideration of these resources, which “fray [...] the boundaries separating language study from social life, student from player, and information consumer from knowledge contributor” (p. 814-815), and their value as supplements to more traditional approaches to second language learning.

Thorne, Fischer and Lu (2012) focused more specifically on World of Warcraft and its potential value for second language learning. Although World of Warcraft and many of its third-

party resource websites are available in several languages, the Dutch-speaking players whom the study investigated all played the game and viewed the websites in their second language, English. Thorne et al. obtained text samples from sources that players reported encountering most often in the course of regular gameplay; these include both texts presented within the game and player-generated texts from the three most frequently consulted resource sites. They judged the complexity of these samples on several linguistic measures and found a quite diverse range, with sentences ranging from the very simple to the very complex. Although the exact proportions varied for each of the four text sources, sentences judged to be formed at the most complex level appeared most frequently throughout. Thorne, Fischer and Lu concluded that although, as always, the extent to which the individual learner interacts with available resources will vary, World of Warcraft seems to present a high-quality, linguistically complex environment for second language learners.

Thus far, there have been few attempts at studying the spatial language used to navigate virtual worlds. Keating and Sunakawa (2010) studied the strategies with which players of City of Heroes managed spatial interaction in the game world and in the real world at once. Although they briefly touched upon the possible reconfigurations of physics which necessitate new ways of describing space in virtual worlds – e.g. “I fell down. Oh. I fell up” (p. 338) – they focused mainly on instances of real-world gesture and participation cues among the players in their study, who were sitting in the same room while playing together.

Lawson, van der Zee and Daley (2009) provided an admirable summary of the potential of virtual environments and other technology for researching spatial language, but this was followed by a “computer-mediated” communication experiment which demonstrates nothing

about computer-mediated communication or virtual spaces at all. The task they set for their subjects – guiding a confederate with step-by-step directions to move a figure along a target path through a small maze, viewed from a static top-down perspective – could have been administered with no significant changes upon a wooden game board or a sheet of paper; the only claim it has to being a “virtual space” rests upon the fact that the task happened to be presented on a set of computer screens. In addition, instead of limiting communications to instant messaging or any of the other classic computer-mediated communication channels, the experimenters allowed the subjects to speak directly to the confederate, who was sitting in the same room. Lawson et al. attempted to excuse themselves. “It is apparent that our virtual environments to date bear little resemblance to 'real' game environments,” they said, going on to claim that if they had made the area more 'realistic' by adding trees, the subjects might have used them as landmarks (p. 173). This is missing the point entirely. It is their choice of a static top-down perspective, not their landscaping, which sabotages any similarity between Lawson et al.'s maze and a full, immersive virtual world where a player's field of view is limited and changes in accordance with the character's movements. The functional difference is as vast as that between the ability to give directions with Absolute terms while looking at a map, and the ability to speak fluent Tzeltal. The sad result is that, although Lawson et al. could have provided valuable insights about spatial language in virtual worlds, they only really furnish data on the ways their subjects adjusted their direction-giving strategies when their interlocutors make mistakes in following them.

Newon (2011) took a more practical approach, examining data gathered from her fifteen months of participant observation in a large World of Warcraft guild (p. 134). In addition to

reporting how players construct novice and expert social identities through their communication styles, Newon identified the use of character movement to supplement and extend the use of deictic terms when discussing spatial concepts. She described an example where an experienced player instructed a group of other players in the locational tactics the group would use when collaborating to fight a computer-controlled monster. While this player “vocally produces spatial directions of where each player should be positioned during a specific fight, he or another expert player will often move their own avatar to the place described or a similar location outside the immediate location” (p. 149). The experts frequently proceeded to jump repeatedly in place to indicate the intended meaning of deictic locational terms such as “here” or “there”, an action which Newon termed a *deictic stomp* (p. 150). Other players confirmed their understanding either verbally or by moving their own characters near those of the leaders. In this way, players used both deictic terms and movement to “co-construct and maintain the space in which the game takes place” (p. 151).

Following in Newon's footsteps, I will present data taken from recordings of World of Warcraft play sessions, candid utterances which illustrate the variety of spatial systems used by players to describe their virtual surroundings, give directions and solve tasks. To fully understand the context of these strategies, let us take a brief look at the features and limitations inherent in the structure and the space of the game world.

Orientation in virtual worlds. First, it is vital to understand that the eponymous “world” of World of Warcraft, a fantasy-themed planet named Azeroth, is a *place*, not a game. Richard Bartle, writing in 2004, summarized the matter elegantly: “[V]irtual worlds are not games. Even the ones written to *be* games aren’t games. People can play games *in* them, sure, and they can be

set up to that end, but this merely makes them venues. The Pasadena Rose Bowl is a stadium, not a game” (as cited in Boellstorff, 2011, p. 510; original emphasis). As an MMO, World of Warcraft is not a linear experience like a book or a movie. Nor is it a gated experience like traditional console video games, which restrain players in small, clearly-defined “stages” and require them to achieve certain objectives before they are allowed to progress to subsequent areas. Once a player creates a character and enters Azeroth, the character can begin to explore the vast world right away. Azeroth is a staging ground where each player may always choose his or her own goals – socializing with other players, crafting trade goods and selling them on the free market, fulfilling the requests of certain computer-generated characters in return for virtual money and items, dueling other players, banding together to kill a fearsome monster, and so on.

In some respects, the way in which players relate to and interact with the virtual world through their characters is familiar. Although players may create dozens of characters, they are only in-world with one at a time. This virtual body, this avatar, becomes a player's viewpoint; with a small number of exceptions for cinematic moments, players are limited to seeing only what their characters can see. Audio effects such as the sound of a ringing hammer or the snarl of a dragon grow louder as characters approach their source and quieter as characters move away. Characters can interact with objects in a very small radius around themselves; even if a player can see an object in the distance, the character must approach it to interact with it.

However, there is one key difference in perspective that World of Warcraft, like many MMOs, allows. The anthropologist Boellstorff (2011) discussed this difference and its implications for virtual embodiment:

It is common in Second Life (and a range of other virtual worlds and online

games) to view one's avatar in a "third-person" perspective, such that you see your avatar from a slight remove, glancing over its shoulder so to speak. But it would be incorrect to construe such a perspective with being disembodied, for regardless of whether or not one is using a first-person perspective, a third-person perspective, or switches between them, the avatar is the locus of perception and sociality. (p. 507)

Although the choice of a third-person view may not prevent players from feeling embodied in their characters, it does give rise to an interesting effect. In third-person perspective, players can swivel their viewpoint cameras to see all 360 degrees of their surroundings. Although the camera stays centered above the character's head, players can look behind their characters, or in any other direction, without turning the character itself. The disjoint between the direction a character faces and the direction the player views is not made apparent to other players, who can only see the character's facing. The implications of this will be explored later on.

The second main point of interest for orientational purposes is the fact that, as a fully-fledged virtual world, Azeroth possesses a robust system of cardinal directions, which figures prominently in the game. Several major locations incorporate the cardinal points in their names. For example, one of the four continents is named Northrend and another is named the Eastern Kingdoms; two contiguous regions of the latter are named the Western Plaguelands and the Eastern Plaguelands, and another is named Southshore.

Players are helpfully provided with not one, but two map systems to assist them in navigation. The full-screen general area maps are usually hidden from view but can be accessed by pressing a certain button on the screen or key on the keyboard; doing so causes the character

to perform a unique animation that involves producing a scroll and holding it open until the general map is closed, visually alerting others in the area that the player is busy looking at the map and not at the game world. The general area maps are always oriented with north near the top of the screen. They display a stylized version of the region, marking only very large geographical features such as towns and rivers. The character's current location is also shown as a thin triangular pointer similar to the needle of a compass, pointing in the direction on the map which the character (but not necessarily the player) is facing in the virtual world.

The second map system, called the *mini-map*, is a small circular map of the character's immediate surroundings, which is always visible in a corner of the screen. Like the general map, it is oriented with north near the top of the screen (the frame even displays a small N at the top) and the character's location and directional facing are indicated by a triangular pointer. Unlike the general map, which shows the entire region at once, the local area displayed on the mini-map moves with the character. It displays detailed representations of everything within a certain radius of the character, from static landmarks like buildings and trees to wandering entities like monsters and even other players. Clicking on a point on the mini-map, called *pinging* the map, causes the mini-map to play a distinctive sound and display a small flashing circle on that point for a few seconds. This is mainly done when one player wishes to highlight a location of interest to other players in a group; the ping appears on the location in question on the mini-map of everyone in the group.

One last feature of note is not provided by the base game but rather by third-party programs (called *add-ons*) which players download and use to augment their personal play experiences. Some of the most commonly used add-ons are those which display numerical GPS-

like coordinates in conjunction with the maps; TomTom, possibly the most popular add-on of this category, boasts over seven million total downloads (“TomTom,” 2014).

Method

I transcribed 29 video recordings of candid World of Warcraft gameplay, focusing specifically on videos which featured content related to spatial language and task-solving. In order to better identify and investigate what environmental or gameplay factors might affect the usage of spatial language, I categorized the videos into two groups, defined by two of the three major styles of WoW gameplay. The first, which I will dub *world exploration*, is a very relaxed, leisurely method of traveling through the world, often alone or in very small groups. The second, *player versus environment* or PvE, is a structured activity in which ten to forty players cooperate to defeat formidable computer-generated foes, commonly called *bosses*. PvE activities are often pre-scheduled events, take place under the aegis of one or two designated leaders, and involve detailed strategy-building. (The third major style of gameplay, *player versus player* or PvP, yielded extremely little useful spatial data.)

In total I analyzed 378 minutes of data from 16 world exploration videos, and 141 minutes of data from 13 PvE videos. (PvE videos traditionally only show one boss encounter per video and thus tend to be short, typically around ten minutes each.) These videos simultaneously capture both the visual aspect of what the characters do and where they move within the virtual world, and the audio aspect of what the players say to each other through voice-chat programs. Twelve of the PvE videos were chosen from YouTube, which hosts a wealth of videos of successful boss encounters, although recordings with the player discussion audio intact were rare

and difficult to find. Since world exploration is not as popular a subject on YouTube and videos with player commentary would be almost nonexistent, I recorded all sixteen world exploration videos myself over the course of sixteen months of participant observation in a medium-sized guild, as well as the one remaining PvE video when the guild first attempted new PvE content. In the interests of privacy, all speaker names have been replaced by single initials as pseudonyms. Where I could identify the same speakers across multiple videos, each speaker keeps a single unique initial to denote them throughout. In videos where this is not the case, I use A, B, C, etc. in order. When people refer to each other by name, I replace that in the transcription with the italicized pseudonym-initial of the person in question.

Analysis

Frames of Reference

One evident consequence of the structure of gameplay manifests itself in spatial language immediately. Because the latent narrative of the game world treats characters as adventurers who travel *through* strange lands rather than living *in* them, the spatial references produced by players nearly universally take the form of giving or agreeing upon directions to travel to a certain place. There are only three instances of players describing the spatial relations between two objects, and two of them do not even involve the three classic frames of reference. One invokes the vertical axis (“the hammer is on top of the giant mushroom”) and the other is an example of what Levinson calls a non-coordinate system, relying on proximity rather than angular relations to describe location (“they're at that uh portal right up next to the entryway”). (The third instance will be discussed later on.) Thus the prototypical examples of each of the three frames of

reference, unlike in most linguistic data, do not look like “the ball is [north of the teapot | at the teapot's spout | to the left of the teapot]”. Rather, world exploration spatial data typically looks something like “let's go [north | to the left | towards the coast]”. PvE spatial data might look like “move [north | to the left | toward the boss's tail]”.

At first glance the trends seem clear-cut. Instances of Absolute terminology appear with regularity in world exploration situations; twenty-four Absolute terms were produced in fourteen separate conversational segments in the exploration data, whereas the PvE videos featured only two conversations with a single Absolute direction each. Intrinsic terms were difficult to find anywhere, with only two tokens in exploration data and four in PvE. Relative terms appear only in specific types of PvE encounters. The PvE data exhibits 39 instances of Relative terms, but 35 of these instances come from just four videos, which depict encounters with certain qualities that seem to facilitate a Relative frame of reference.

Table 1

Usage of frames of reference in exploration and PvE videos.

	Absolute	Intrinsic	Relative	Uncertain (I/R)
World Exploration	24	2	0	3
Player versus Environment	2	4	39	4

Absolute. The constant, prominent availability of maps, perhaps unsurprisingly, paves the way for increased accessibility of the Absolute spatial system. Of the three classic linguistic frames of reference, this seems to be the preferred frame for giving directions in the casual circumstances of world exploration:

- (1) Expert players attempt to direct a novice player to join them.

1 K: if you [don't have] these things

2 W: [sorry]
3 B: if you don't have these things I ported to Thunder Bluff and I'm
4 flying there now
5 W: where is it? assuming I'm taking the, go to Thunder Bluff and, fly
6 like an idiot? strategy?
7 B: [um the south-east corner]
8 R: [the south the very south of Kalimdor]
9 R: but *W W* you've been to Uldum you don't have to fly from
10 Thunder Bluff

R proceeds to type out their next two lines in the game chat client:

11 [R:] *W* you can go to uldum
12 [R:] and from there to tanaris which is just east of uldum

This may seem only natural, as English-speakers do use the Absolute frame of reference to give directions, especially on large scales or when looking at a map. However, with the increased availability of maps and compasses, players in world exploration settings adopt Absolute directions not only when referring to large regions as in (1), but also their immediate surroundings. The potential paths under discussion in (2) lead to areas that lie only a few minutes away from each other:

(2) Discussing where to go next.

1 E: aright east or west .hhh
2 U: wh:at's to the west
3 E: silverpine
4 U: s:silverpine's to the south
5 E: yeah southwest
6 U: u:m let's finish up this zone first

Similarly, though the players are discussing a faraway location in (3), the specific areas they refer to lie on a very small scale, within a few minutes of travel time:

(3) Standing in Tirisfal Glades and speaking about Elwynn Forest, a distant area.

1 U: you know I actually think that um, this is one of the starting zones

2 that, after the Cataclysm¹? the: actual leveling path changed
3 E: oh yeah?
4 U: yeah like you know how um the human starting zone? you know
5 before and after it's, you start in Northshire and then you come
6 down south to Goldshire and then, you like move all the way east
7 E: mmhmm
8 U: um, I think, uh, the revamped, uh
9 (1.7)
10 U: the revamped Tirisfal, brings you to Brill a lot sooner than the old
11 one and then just sends you out, you know, kind of in radiating
12 [directions] from it
13 E: [mmhmm]

Coordinate system add-ons like TomTom also help to make Absolute terms more accessible to players. Numerical coordinates are especially prevalent in written descriptions of locations; player-submitted comments on a popular third-party resource website tend to favor them so heavily that comments which suggest other strategies often begin with 'for those who don't have coordinates' or similar phrases. To illustrate, of the eight community-voted best comments on a page describing a computer-generated character named Ik-Ik the Nimble (a monkey-like creature who hides in a cave which players often struggle to find), four name his location by providing coordinates, while only two use cardinal directions (“south of Kypari'ik and Duskwood Fen”; “on a hill north of Soggy's Gamble”). One comment even describes his location in relation to a nonrepresentational feature of the general area map: “The entrance is directly between the P and A of [the word] KYPARIZAR, on the map” (“Ik-Ik the Nimble”, 2014). Players are expected to follow directions of this type by maneuvering their characters until their personal location indicator reaches the specified landmark on the map, despite the fact that it is not a representation of any landmark in the virtual world.

One might argue that the mere use of Absolute terms alone does not signify that players

1 The Cataclysm is the name of a major in-world event which changed the geography of much of Azeroth.

are necessarily using a primarily Absolute cognitive strategy. Perhaps the ubiquitous maps, instead of giving players the required cognitive skill to shift to an Absolute mindset, are only acting as a crutch, an interface which allows them to translate their native frames of reference into terms supported by the game world. After all, players often consult their maps to reorient themselves or check the location of areas of interest; it is easy to see when this happens because of the animation which characters perform when the player is looking at the map.

(4)

1 U: okay so once we're done with pumpkins here uh we have to do
2 the murloc thing [where's that?
3 U: [((opens map))
4 (2.0)
5 U: north of here?
6 E: uh up [north
7 U: [((closes map))
8 E: yeah
9 E: along the coast

The phrase “along the coast” is difficult to code here. It would be tempting to see it as a straightforward abandonment of the Absolute frame of reference (“up north”) in order to restate the directions in Intrinsic terms, referencing a specific feature of the area (its coast). The problem is that this would be a very poor restatement indeed; the area in question has extensive coastlines all along its northern, western and southern borders. The phrase must then be meant as a supplement to the Absolute directions, not reframing but rather refining its meaning.

Perhaps the most compelling available argument against the possibility of players simply “translating” a more natural frame of reference into game-favored terms is this: why are there so few instances of Intrinsic and Relative utterances in casual gameplay?

Intrinsic. In contrast to the sixteen total conversational segments that include one or

more uses of Absolute terms, there are only six definite uses of the Intrinsic frame of reference in the data, in addition to a handful of instances where there is insufficient linguistic or spatial context to determine whether the direction is used in an Intrinsic or Relative manner (e.g. “to the back”). The four clear-cut Intrinsic situations in the PvE data are all framed as strategies for players to orient themselves in relation to the various body parts of oversized bosses.

However, on closer consideration, two of these uses of Intrinsic terms cannot be wholly attributed to player choice, being dictated by the terms already present in the game. In one case, players facing a giant dinosaur are advised not to stand *near its head or tail*. The reason for this wording turns out to be that the dinosaur will eat players too close to its head, and slam any players behind it with its tail. The choice of these terms to describe the prohibited space, then, is not arbitrary, but directly (even brutally) practical. The second case suffers even more directly from the influence of the constraints imposed by the virtual world. Players must steer an ancient giant-like creature away from obstacles by attacking one or both of its legs, coordinating and timing their assaults to make it turn towards one direction or the other. Often there is a designated leader who calls out *left leg* or *right leg* as the encounter progresses (never *turn him left* or *turn him north*). This would be a wonderful example of players using an Intrinsic system – if it were not for the fact that the giant's legs are two entities that are coded separately from the giant itself, assigned the proper names of Left Leg and Right Leg by the game. Although this may be evidence that the game designers prefer the Intrinsic system, it sadly tells us little about the players, who have little choice but to call these objects by their proper names.

The two uncompelled Intrinsic tokens in PvE data come from the video of an encounter in which all three systems of reference are eventually used. The characters begin in a close group

on one side of a large circular platform; the boss, a giant anthropomorphized manifestation of wind, floats over the platform's center. Clusters of dangerous whirlwinds sweep towards the group, and players call out phrases such as “middle, coming from the right” to describe in Relative terms the location of the safe area and the direction from which the whirlwinds are approaching. In the next phase of the fight, the platform shatters and the characters are hurled into empty space. At this point the leader of the group says, “On the south side now,” to indicate the general area where players should regroup. Shortly afterward, the characters are given the ability to fly around the immediate area, adding a vertical dimension to the encounter as well as a new hazard, lightning clouds floating in the air which characters must avoid. When the group needs to congregate again, the leader orients players in relation to the boss by saying they “should be on his chest, in the front”, and thirty seconds later, “we are at the head, fly back in to his head”. Since this encounter involves a great deal of precise maneuvering, including motion in the vertical plane, it can be particularly challenging for players. The leader uses every spatial tool available, including some not yet discussed, to help the group stay focused and together.

Relative. Although it may seem at first glance that the Relative frame of reference is the most commonly used, with 39 tokens compared to the 26 of Absolute, the scope of its usage is actually very limited. There are no recorded occurrences of unambiguously Relative statements in world exploration, and just four of the thirteen PvE videos account for 35 tokens or nearly ninety percent of Relative usage. The situations which seem to foster the use of the Relative frame of reference are those in which the group is gathered closely together and both the group and the boss remain stationary through a significant portion of the encounter.

Why might this be? Consider that Relative terms are built upon an egocentric system,

calculating angles between the viewer, the figure and the ground. Such a system rapidly breaks down into ambiguity and confusion when, as is usually the case in PvE encounters, all of the potential viewers (and often the figure and ground as well) are constantly ranging semi-randomly over the available space. Even when leaders are laying out tactical plans before the beginning of the encounter proper, they have no guarantee that the players are viewing their surroundings from the same angle. A character who is facing the correct direction might be controlled by a player who is looking in a completely different direction. Thus, only highly static situations in which the entire group is paying attention to a single prominent entity (usually the boss) serving as the ground, can successfully assemble all of the necessary pieces to employ the Relative frame of reference in any meaningful way.

One such encounter takes place in a circular room, with the boss located in a large, impassable pool of water in the center. The area in which characters are free to roam is therefore essentially a ring, subdivided into seven platforms. This setup permits an intuitive and continuous notion of left and right; characters can spread out wherever they like along the ring, and as long as everyone faces the boss in the center, *left* always translates into clockwise and *right* into counterclockwise. This is not a consciously constructed group agreement, but an intuitive, implied understanding which makes the following exchange intelligible:

(5) Discussing character placement in an area along the ring.

1 B: it's a cone, so, you know if if, V or me were tanking him uh,
2 shaded over to the right of the platform it you know could've
3 crossed boundaries
4 D: I think I'm gonna go on the left side of you guys then if you're
5 switching back and forth, to that center, cause I like being able to
6 heal you both
7 B: yeah whenever I swap out I always go to the to the platform to
8 the left of the yellow one? I'm not sure where V goes it looked

9 like he was going the same way

Another encounter which seems friendly to the use of Relative terms takes place in a mostly featureless square room. The boss remains in the center of the room throughout; the majority of the players' characters form a tight group close to one side of the boss. Periodically “rifts” will appear on the ground, which characters must run towards and close. From where the characters stand, the direction of the boss naturally becomes a sort of implied collective *forward*; left, right, and back follow. The first explicit request for directions comes partway through the encounter:

(6) No previously-established set of directional facings.

1 A: is there a, a rift up somewhere?
2 B: yeah
3 C: it's on the right

A few minutes later, the viewpoint character of the video is momentarily facing in the opposite direction from the rest of the group. Another player calls out, “Rift to the right.” Even though this rift happens to be on the character's subjective left, the player only hesitates a moment before he successfully identifies this as a reference to *right* from the perspective of the general group.

But is this truly a Relative system, or are players actually using Relative terms to denote Absolute axes? Identifying another speaker's *right* as different from one's own is natural and unremarkable within a Relative framework. However, at another point in the video, a player says, “Rift right behind the prison” – a rare case of spatial relations between two objects. The “prison” in question is some distance to the left of where all of the characters are standing. Parsing this statement in a truly Relative sense would give rise to the expectation that the rift is

further left of the prison, so that the prison lies directly between the rift and the players. This is not the case. The rift, in fact, lies in the *behind* direction from the prison, so that characters, prison and rift form an L-shape. Is this enough to conclude that the players in this video are employing an Absolute system disguised as a Relative one? The matter is unclear, and for now I will continue to count these tokens as Relative, though with some misgivings.

Communications in PvE situations always prioritize speed and ease of understanding. When an encounter allows players to come to a group consensus about where to anchor their mental point of view, players will use Relative terms repeatedly; the players in the two encounters described in this section produced eight and nine instances of Relative terms, respectively, and did not use Absolute or Intrinsic markers at all. But such serendipitous situations are rare.

Non-Coordinate Systems

This prompts the question of how players are able to discuss spatial concepts at all. In over five hundred minutes of recorded data, do players really only describe locations or give directions seventy-odd times? The answer, of course, is no. As it turns out, the spatial systems that players tend to favor most heavily when speaking and navigating in Azeroth are not the three 'classic' systems of reference.

According to Levinson (1996b), the semantic domain of space most likely has “internal natural cleavages” (p. 359), forming different classes and subclasses in the ways we view and address spatial problems. Coordinate systems or frames of reference comprise one major class, which is further divided into horizontal and vertical frames of reference. The Absolute, Intrinsic and Relative frames of reference fall under the 'horizontal' subcategory. But the second major

class, non-coordinate systems, seems to have been neglected as a comprehensive spatial framework. Although its individual components are popular and well-trodden areas of research, no linguistic study to my knowledge presents samples from more than one of them as related phenomena, and Levinson himself does not revisit or even mention non-coordinate systems in his later works on frames of reference.

The non-coordinate spatial strategies which Levinson addresses are prototype deixis, contiguity or “topological” relations, and named locations. These are all strategies which eschew “substantial Euclidean geometry” (Levinson, 1996b, p. 365), omitting the angles between viewer, figure and ground to focus instead on indicating the figure through general proximity.

Table 2

Usage of non-coordinate spatial systems in exploration and PvE videos.

	Prototype Deixis	Topological Relations	Named Locations
World Exploration	50	17	56
Player Versus Environment	16	74	0

Prototype deixis. Although deictic concepts in general pervade the study of spatial relations, the specific focus here is on prototype deixis: the use of terms such as *over here* or *this way* to indicate proximity without specifying angular relations. Levinson states that speakers often clarify the deictic referent of their statement by accompanying it with a gesture (p. 362). Players have the capability to make their characters perform a short pointing animation, but this is rarely used; the standard accompanying gesture in Azeroth involves a short burst of motion toward the indicated direction to catch viewers' attention:

(7) B breaks off speech to begin running in the indicated direction.

1 B: I'm going to be tanking him starting
2 (2.0)

3 B from this direction over here

Players also use deictic stomps and pings on the mini-map to help indicate the general vicinity of the deictic referent to others around them:

(8) U moves to the location in question and performs a deictic stomp.

1 E: trying to find Lilian Voss
2 U: she's: uh, >back here<
3 (1.5)
4 U: ((jumps))

(9) L uses mini-map pings to supplement the word 'here'.

1 W: um with apologies I don't actually know Shattrath (.) uh I portaled
2 into some large central room that has
3 L: yes, um
4 W: two visible portals by a portal trainer between
5 B: oh
6 W: if there's somewhere else I'm supposed to be I don't know where it is
7 L: I'm also [in this room]
8 B: [I'm coming t-]
9 R: all right you need to you need to fly to Shadowmoon, Valley? it is
10 where Sunwell is
11 L: what?
12 B: n:o
13 L: that's Black Temple
14 R: it isn't am I wrong? (.) oh wait no crap it's not it's the island place, and
15 I w- did the wrong thing, ignore me I'm bad at life
16 L: uh W I'm in this place with you I am also
17 [trying to find the portal, where is the portal]
18 R: [no Black Temple is Shadowmoon Valley, bother]
19 L: argh where is the portal
20 (2.5)
21 R: there are two portals it's the one that's not Orgrimmar or Stormwind=
22 L: =okay the portal's over here
23 (1.7)
24 L: ((mini-map ping))
25 (2.0)
26 L: ((mini-map ping))
27 (2.0)
28 L: ((mini-map ping))

Movement and gesture are not strictly necessary, however. The character's body alone may also function as a kind of deictic pointer.

(10) U is standing still, near the entrance to a tunnel which E has bypassed.

1 U: nn this way
2 (4.0)
3 E: oh
4 E: ((begins to run towards U))

Prototype deixis is one of the most popular spatial strategies, with fifty tokens from exploration data and sixteen from PvE. It can perhaps be seen as a simpler substitute for the Relative frame of reference. In a world where viewing angles shift constantly and there are few paralinguistic cues to signal when a player has secured a listener's attention, expecting listeners to mentally juggle the locations and relative angles of figure, ground, speaker and listener – in addition to the other tasks the listeners may be performing – is often too much to ask in casual conversation. Prototype deixis simplifies the process of comprehension by simply situating the figure near the speaker's location, or in the direction of the speaker's movement.

Contiguity or “topological” relations. Here Levinson speaks mostly about spatial prepositions such as *in*, *at*, and *on*. He delves into studies showing that these expressions almost never map well between different languages, which use them to carve up semantic space in different ways. With this in mind, let us take a moment to explore several possible meanings of the preposition *on* as used by players in Azeroth:

On a table. This phrase is glossed as most English-speakers would understand it. It is used to describe characters who are standing on top of objects such as barrels or chairs.

On a boss. “On” here typically means attacking, or otherwise focusing attention onto, a monster or a player. It is very commonly used in PvE situations. Leaders can detail strategies

before a boss encounter by saying “warriors on adds², everyone else on the boss”; in the middle of the encounter they can give abridged directions such as “all on boss”.

On me. Although this phrase in a larger context such as *boss on me* could be parsed as “the boss is attacking me” as explained above, by itself *on me* means “everyone come to where I am”. *Stay on me* implies an additional aspect of “remain close to me when I move”.

Of the three, the last usage is a clear example of topological relations. Phrases such as *on me* are most popular in PvE situations, filling the role of quick proximity-based directions for PvE encounters much as prototype deixis does for world exploration. These phrases are often accompanied by the verb *stack*, meaning to cluster closely. (The opposite of *stack* is *spread*, which needs no clarifying spatial preposition.)

(11) From the same encounter as the Intrinsic usages.

- | | | |
|---|----|-----------------|
| 1 | A: | just go down |
| 2 | | (0.5) |
| 3 | A: | above the cloud |
| 4 | | (1.3) |
| 5 | A: | right here |
| 6 | | (0.7) |
| 7 | A: | stack on me |

In addition to referring to being *on* or *near* or *at* the speaker, players can also use pillars of colored light to mark certain locations; these pillars are called, appropriately, *world markers*. Each world marker has both a color and a shape associated with it, so players can speak of being *on square* or *at blue* to refer the same location.

(11) Setting up positions before a PvE encounter.

- | | | |
|---|----|---|
| 1 | P: | so wait I thought <i>M</i> was at purple |
| 2 | B: | yeah <i>M</i> 's at purple <i>L</i> 's towards red and <i>D</i> I know hangs out kinda towards the left of the yellow usually |

2 “Additional” monsters that appear during a boss encounter.

(12) A typical minute of speech during a PvE encounter.

1 A: green start moving
2 (2.8)
3 B: have at it
4 (1.6)
5 B: [do this correctly please]
6 A: [stay spread,] stay spread
7 (3.5)
8 B: diffusive chain one second
9 (7.0)
10 B: bouncing bolt, static shock
11 (4.5)
12 B: (?)
13 (6.0)
14 C: stack on green, come on
15 (7.5)
16 C: stack on X
17 (10.5)
18 A: stack on green

Topological relations are not as ubiquitous in world exploration as they are in PvE; there are only 17 tokens in exploration data, as opposed to 74 in PvE data. The ability to quickly and unambiguously designate a specific location proves invaluable for the fast-paced environment of PvE, and there are only two PvE videos which do not use topological relations at all.

Named locations. The last major strategy that languages use to avoid the necessity of coordinate systems is “to proliferate named locations” (Levinson, 1996b, p. 365). Once a landscape is broken up into many discrete parcels of land, each with its own name, speakers can use this strategy in conjunction with topological relations to say that a figure is “at” the named location. There is some fascinating anthropological research, notably from Hunn (1996), which indicates that the density of place names in languages which rely heavily on this spatial strategy often correlates with the density of their speaker population, perhaps due to a natural limitation

on an individual's cognitive capacity for place names.

In Azeroth, the multitude of place names is not generated organically by the player base, but rather coded into the game itself. Planets (e.g. Azeroth, Draenor) are divided into continents (e.g. Kalimdor, the Eastern Kingdoms) which are divided into *zones*. These zones tend to have a single biome each, such as desert or jungle, and might bear a name reflecting the landscape, such as Wetlands or Desolace. Each of these zones is further subdivided into named subzones, which are often only large enough to hold a single feature of the landscape, such as a farm, field or tower. At the level of the subzones, the number of named locations becomes truly dense; a character riding a horse through the forest outside of the human capital city can cross through nine unique named subzones in just over two minutes.

Players do not hesitate to make use of such a dense array of named locations as reference points. In the brief conversational segment presented in (1), players mention four unique named locations as reference points while they direct another player to join them. In PvE situations, where players generally remain within a small space throughout the duration of the encounter, named locations are of little use, but they can be invaluable in certain world exploration situations. Two of the world exploration videos boast twenty and twenty-one instances of named locations; a handful of other tokens scattered across the world exploration data brings the total to fifty-six instances.

Conclusion

The two play styles engender widely varying strategies for discussing spatial situations. The ready availability of maps and methods of orienting characters to the cardinal directions

strongly encourages widespread use of the Absolute frame of reference in the course of world exploration, which affords players the time to leisurely cross-check their maps with their surroundings. In the fast-paced, movement-heavy setting of PvE encounters, the Absolute frame of reference is less successful. With the exception of a few specific encounter types, the PvE play style does not take well to Intrinsic or Relative strategies either. Players from both play styles turn instead to non-coordinate spatial strategies to fill their everyday needs, but even here their needs and therefore their usages diverge. World exploration lends itself well to both an extensive system of named locations to discuss space on a large or theoretical scale, and a simple proximity-based system of prototype deixis in conjunction with movement as gesture to specify direction and location on a smaller, immediate scale. The hectic nature of PvE, on the other hand, favors quick, unambiguous terms that will not require players to constantly calculate angles between themselves, the figure and the ground. When a PvE encounter does not allow for an easy Relative anchor, players tend most towards using the succinct terms of topological relations, sometimes augmented with world markers, to describe where they or their opponents should be.

The environment and structure of World of Warcraft, then, seems to have accomplished by accident what Li and Gleitman's 2002 study aimed but failed to do: make speakers of English prioritize every other spatial system over those which English favors, Intrinsic and Relative. In anticipation of criticism or counter-arguments such as those which Levinson (2002) hurled back upon them, let us reexamine the data to ensure that everything has been classified correctly.

The first point to examine is this: can Azeroth's cardinal directions truly be called an Absolute system, or can the virtual compass points be argued to be the landmarks of a disguised Intrinsic system? How “fixed” must fixed points be, in order to qualify to cross from the realm of

the Intrinsic to the realm of the Absolute?

Terrill and Burenhult (2008), in the middle of a typological study of the classic frames of reference much in the vein of Pederson et al. (1998), paused to take up the question of landmarks and exactly which frame of reference they belong to (p. 122). The Pacific Islander language of Lavukaleve and its related languages, rather than using an uphill/downhill axis as Tzeltal does, uses a system which holds *inland* and *seawards* as opposing directions – a radial rather than a cartesian system. Are these absolute directions, they asked, or are the mountain peak and the sea supposed to be viewed as landmarks? How can we know how abstractly speakers treat these axes? For that matter, how abstractly do speakers treat even the cardinal directions? Terrill and Burenhult found that Lavukavele speakers undergoing the man-with-tree test, though using terms customarily glossed as *north/south/east/west*, used *north* far more often than any of the other cardinal directions, followed by *east*. In addition, they expressed widely varying levels of accuracy using these terms in relation to the actual compass points. “One director used west correctly, but north, east and south incorrectly. Two directors only used north, but used it incorrectly every time. [...] Only one director used all four compass points, using them correctly every time” (p. 124). This suggested to Terrill and Burenhult that the cardinal directions, normally perceived as Absolute bearings, are not in fact abstract and interlocking; knowing the direction of one does not impart the speakers with the knowledge of the others. Rather, each point is memorized and encoded separately from the others, perhaps connected to a local landmark.

Haugen (1957) and Jackson (1998) also reported that Old Norse and Icelandic literature tended to use the names of the cardinal directions in two distinct ways – one “correct” orientation

in which *north* corresponds to cardinal north, and one “incorrect” orientation in which a man could say he was going north while actually traveling directly south, or say he was sailing west from Wales to France. The first system, they determined, was consistently used at sea or when describing objects in close proximity. The second, far from being “incorrect” due to speaker error, sprang from deep-rooted cultural traditions; the Old Norse worldview, for example, divided the world into northern, western, eastern and southern segments, and described any travel within one of these segments as traveling “towards” the corresponding direction.

Given that the lines between concrete and abstract, Absolute and Intrinsic, are already blurring, it may be worthwhile to keep in mind that our own usage of *north* and *south* is less abstract than we would like to think. Although Levinson insisted that Absolute bearings are fully abstract and not landmarks to which one might walk, the North and South poles are in fact concrete locations which can be reached. If one walks far enough north, and continues walking in the same direction, one will find oneself no longer walking north. In comparison to this, the compass points provided in virtual space may even be a *more* abstract and true representation of the Absolute spatial system than the compass points of the physical world.

The second point of possible contention is this: are the constraints placed upon players within the virtual world too obviously contrived to produce results that disfavor Intrinsic and Relative terms? After all, the ready availability of maps and compass may act as a crutch to encourage the use of the Absolute system, and the proliferation of named locations is coded into the game itself, ready and waiting for players to use them in everyday speech. Are these considerations enough to disqualify data from Azeroth as being valid linguistic data on English speech? I believe that the answer here must be a resounding no. Li and Gleitman attempted to

contrive a situation which would disfavor the Relative frame of reference, with mixed success in that they elicited the Intrinsic frame of reference instead of the Absolute. Haun et al. explicitly instructed their participants to switch frames of reference, also with limited success. The fact that World of Warcraft, which was not set up as a linguistic experiment, can induce its players to shift their normal spatial strategies is therefore quite noteworthy.

This leads us to a few concluding thoughts. First, it is unclear just how far these results may go as a counterargument against Levinson's hypothesis that a language *influences* its speakers' preferred frame of reference. Although the circumstantial influences examined here overcome the influence of native language in gameplay situations, there is certainly no evidence that English-speaking players of World of Warcraft might change their preferred spatial strategies while outside of Azeroth. However, these results must certainly stand against a potential stronger Whorfian claim that a language *determines* its speakers' preferred frame of reference – a claim which much of the research that followed upon Levinson (1996a) was well on the way to supporting. Second, it is worth noting that English benefits from having a fully-formed Absolute system already, although one which is rarely used by speakers except in the presence of a map. The increased use of Absolute terminology by players when provided with maps and compasses, therefore, is not as astonishing as the vastly decreased use of the Intrinsic and Relative systems should be. Third, just as Levinson et al. (2002) argued that learning to speak Tzeltal required a new cognitive skill – namely, the ability to dead reckon – Keating and Sunakawa (2010) pointed out that participation in virtual worlds “can require new habits of spatial reasoning and spatial understanding” (p.332), including but not limited to incorporating navigation in the vertical third dimension into one's moment-by-moment spatial awareness. It may be that veteran players of

MMOs or any other video games may have developed cognitive skills specifically to meet these increased spatial demands. Or it may be that the structure of these virtual worlds brings out common capabilities which do not see daily use and are certainly not elicited in traditional experiment settings. Finally, although all data for this study was gathered in English, World of Warcraft is available for play in ten languages, including Korean, Portuguese, Russian and Mandarin. It would be interesting to see whether these results hold across languages, especially languages which favor different systems of reference than English.

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