

Unpacking a Political Icon: “Bike Lanes” and Orders of Indexicality

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Abstract

Indexicality, the ability of language to evoke the context in which it usually occurs, is a concept commonly drawn upon in sociolinguistics and linguistic anthropology. This paper applies the framework of orders of indexicality (Silverstein, 2003) to political discourse about a controversial topic in Pittsburgh, U.S.A., the construction of bike lanes. A concordance analysis of the term *bike lanes* in news media, blogs and online news comments demonstrates variation in indexical meanings of *bike lanes* between those who oppose and those who support them. We argue that the orders of indexicality approach helps explain how groups with different interests can reinforce or challenge the possible discursive associations of a loaded political term.

Keywords

discourse analysis, political discourse analysis, indexicality, bike lanes, Pittsburgh, media, mayoral election

Introduction

In the political campaign leading up to Pittsburgh’s 2017 Democratic Party mayoral primary election¹, much attention was paid to bike lanes, sections of roads on which cyclists are separated from motorized traffic by means of paint or physical barriers. Less than 4% of city street miles include bike lanes (Bike Pittsburgh, 2017; Pittsburgh Department of Public Works, 2017), but bike lanes became an issue with outsized proportions in this election. Canvassers for the incumbent mayor, William Peduto, who was running for re-election, reported that residents who said they were opposed to the mayor almost invariably cited bike lanes as a reason for their opposition², and the mayor himself acknowledged it as a top concern (Potter, 2017). One of Peduto’s opponents complained because the topic of bike lanes had not been raised during one of the candidates’ forums; his other opponent raised the bike lane issue himself in a television advertisement. By the end of the campaign, the term “bike-lash” (modeled on “back-lash”) was being used to describe opponents’ reaction to Peduto (Smeltz, 2017). Though Peduto continued to support cycling infrastructure, his administration abruptly postponed a plan to add a new downtown bike lane (Blazina, 2017), and the Peduto campaign circulated two last-minute mailers that were pointedly about other issues that Peduto’s opponents had raised³. Clearly, the phrase *bike lanes* had come to stand in for more than just sections of a few city streets. The phrase *bike lanes* could also point to safety for cyclists or inconvenience for motorists or to categories of people (the kind of people who

bicycle or the kind of people who drive) or even competing visions of the city's future. In this paper, we explore how *bike lanes* could come to mean so many things and, accordingly, become as politically powerful as it was.

To do this, we draw on the ideas of indexical meaning (Peirce, 1960) and indexical orders (Silverstein, 2003). These ideas allow us to model how more abstract associative meanings arise out of and are linked to more concrete ones. They provide a useful way to taxonomize the kinds of arguments in which a phrase like *bike lanes* is deployed and to understand how participants in political discourse can talk past each other, strategically or not, by using the same phrase with different associations. As Chilton points out, "political discourse operates indexically" in that "one's choice of language, or features of it, can implicitly signal political distinctions" (2004: 201). However, very little research about political discourse makes use of the concept of indexicality (but see Kirkham and Moore, 2015; Van Dijk, 2002). In showing how Peircean semiotic theory can serve a useful purpose in the critical analysis of political discourse, we thus add a tool to the field's analytical repertoire. In addition, our work supplements that of rhetoricians who have described the working of "narrative icons" (Phillips, 2016), "news icons" (Bennett and Lawrence, 1995; Lee et al, 2011), "ideographs" (Cloud, 1998; McGee, 1980), or visual images (Cloud, 2004) that substitute, in condensed form, for narratives or cultural scripts in media discourse. Much of this work focuses on how one of the many possible associations of a word or phrase like "Tiananmen Square" or "family values" comes to dominate how it is used in public discourse. However, as we show, the power of a linguistic or visual icon can also arise from the fact that it can call up multiple meanings, at multiple levels of abstraction, as it is viewed through various ideological lenses.

We analyze a corpus of 40 online newspaper articles, blogs, and readers' comments on them. The articles report on three times when bike lanes became especially salient in recent Pittsburgh history: the completion of the first downtown bike lane in 2014, the 2016 death of a cyclist on a street that (controversially) lacked a bike lane, and the 2017 mayoral campaign described above. By means of a concordance analysis, we identify all uses of the phrase *bike lanes* together with the context in which the phrase appeared. We find that *bike lanes* occurs mostly in the context of discourse about physical spaces (separate areas of roadway for cyclists; reduced roadway for motorists), discourse about the function of those physical spaces (safety; inconvenience, danger), discourse about the kinds of people who benefit from or are inconvenienced by the spaces (young, male techie newcomers; longtime residents), and discourse about the benefits or drawbacks of these spaces to the city more generally (economic development; ignoring the opinions of longtime residents).

While discourse around the first protected bike lanes was equally likely to use *bike lanes* in the context of discourse about their physical aspects and purposes, discourse about bike lanes during the mayoral election was most likely to use *bike lanes* in the context of discourse about the kind of city that builds bike lanes. Not surprisingly, positive sentiment toward bike lanes as a safety measure was more likely to appear in discourse about a cyclist's death, while negative sentiment was most likely to appear in discourse about the mayoral election. There were some intriguing differences, however,

between the indexical meanings associated with *bike lanes* in discourse that argued in favor of them and the indexical meanings associated with *bike lanes* in discourse arguing against them. People with a positive attitude toward bike lanes tended to use *bike lanes* when talking about safety and the kinds of people who use bike lanes, often in attempts to expand the pool of people associated with bike lane use. People with a negative attitude towards bike lanes tended to use *bike lanes* in the context of discourse about the physical aspects of bike lanes, arguing that bike lanes take up space that drivers could be using. When they did talk about bike lane users, they tended to narrow the pool of bike lane users and refer to them in ways that suggest that the small group of cyclists and the large group of drivers are two separate categories that do not overlap.

Methods

To broadly survey the variety of associations that *bike lanes* can carry, we selected publicly available texts that represent a spectrum of views and genres on this issue in Pittsburgh. We first identified three recent events that generated public discourse about bike lanes in Pittsburgh:

1. Immediately before the locally hosted Pro-Walk, Pro-Bike, Pro-Place Conference in 2014, Pittsburgh mayor William Peduto led the installation of bike lanes separated by plastic bollards on 1.6 miles of streets downtown and in the academic and economic center called Oakland (Schmitz, 2014). These lanes were the first “protected” bike lanes physically separated from vehicle traffic in the city (PeopleForBikes, 2017); their central location and quick implementation drew significant media attention.
2. In 2016, the highly publicized deaths of two cyclists generated discourse about bike infrastructure and safety in Pittsburgh. In one case, advocacy groups had lobbied for bike lanes in the Pennsylvania Department of Transportation’s redesign and resurfacing of West Carson Street in Pittsburgh. The Department of Transportation did not include bike lanes in their design, however. Nine days after West Carson Street reopened following the renovation, a resident named Dennis Flanagan was killed while riding a bicycle there. Media attention focused on Flanagan’s death, as well as the press releases from bike advocacy group Bike Pittsburgh and a remembrance ride held by the group in honor of Flanagan.
3. From 2017, we selected texts relating to bike lanes in the Pittsburgh mayoral race, in which opposition or support for bike lanes became a central issue.

We chose these three events because they clearly demonstrate the effect that discourse about bike lanes has not only on street configurations, but also mayoral politics and the very lives of residents.

To understand the associations that various groups have in Pittsburgh with bike lanes, we selected texts with a range of both medium and perspective. We used Google News searches with terms relating to each of the three events to discover texts, and included all the news articles we found. The corpus included texts from the *Pittsburgh Post-Gazette* (centrist), *Pittsburgh City Paper* (liberal, pro-bike lanes), *Pittsburgh Tribune-Review* (moderately right of center), and local ABC-affiliated TV station WTAE

(slightly anti-bike lanes). We also considered the online comments that follow these articles, which sometimes included vehement anti-bike lane perspectives. Generally pro-bike lane press releases from the office of the mayor of Pittsburgh were also included, as well as explicitly pro-bike lane blog posts and articles from Bike Pittsburgh, a 15-year-old local cycling advocacy non-profit organization, and PeopleForBikes, a national nonprofit launched by the bicycle industry. These blog posts were popular and cited by news media. Our final corpus consisted of 40 separate documents (comments on an article counting as one document) totaling 29,534 words (see Tables 1 and 2).

Total number of documents	40
Number of words	29,534
Number of instances of <i>bike lanes</i>	216

Table 1. Basic corpus statistics

Document type	Number of documents
News articles	30
Opinion/blog posts	8
Comment threads	2
<i>Number of comments</i>	<i>86</i>
Event	
2014 Protected Bike Lanes	15
2016 Dennis Flanagan Crash	12
2017 Mayoral Race	13

Table 2. Number of documents of each type and event

With the goal of exploring associations of bike lanes in this context, we used the AntConc concordance analysis software (Anthony, 2014) to examine each instance of *bike lanes* in its context of a few sentences before and after. Ignoring capitalization, we found 216 instances of *bike lane(s)* in titles, content, and image captions of documents. In examining broader-scale trends around the use of *bike lanes* corpus-wide, we seek to discover what Fairclough describes as the exercise of power through “systematic tendencies in news reporting and other media activities” (1989) or what Baker describes as the “incremental effect of discourse” (2006, 2010). We supplement this broader-scale concordance analysis with more detailed qualitative analysis of specific examples representative of general trends found in the concordance analysis.

Indexicality

To model how different uses of the phrase *bike lanes* arise and how they are related to each other, we use the concept of indexicality. Indexicality refers to the way any meaningful sign (linguistic or otherwise) points not only to its denotational (“dictionary”) meaning, but also to the context or contexts in which it commonly occurs. The term originated in C.S. Peirce’s division of sign modalities (1960). It has been taken up in linguistic anthropology and sociolinguistics, where it is often used to describe links between linguistic forms and social contexts (Bucholtz and Hall, 2005; Johnstone, 2010;

Ochs, 1992; Silverstein, 1985). We use it somewhat differently, to talk about how a linguistic form can call up the *discursive* context in which it occurs. We treat each appearance of *bike lanes* in our corpus as a sign that, in addition to denoting bike lanes, indexes one or more particular discursive contexts. People who repeatedly encounter the phrase *bike lanes* in a particular discursive context will expect that context to be relevant when they encounter the phrase again. And if the phrase occurs in multiple contexts, different people will come to associate it with different contexts. This sort of multi-indexicality means that the phrase can be used strategically to do more than one thing at a time or to elide one context in favor of another.

In organizing the indexical meanings of *bike lanes*, we use Michael Silverstein's concept of indexical orders, different layers of indexical meaning attached to signs, which creatively build upon and compete with each other (2003). In Silverstein's terms, an indexical order "presupposes" an ideology, but its pragmatic use in context can give rise to a "creative" interpretation of the linguistic feature under a different ideologization. For example, a correlation between a linguistic form and a pragmatic function, like talking in simpler words to a child, can be reinterpreted systematically as "baby talk" that can ideologically make an addressee seem like a child or a speaker like a parent.

We identified four primary orders of indexicality in the discourse on bike lanes in Pittsburgh, each $(n+1)$ st order building on the n th order. To simplify our presentation, we substitute numerals for orders n , $(n+1)$, $(n+1)+1$, and so on, but we stress that this does not mean that the indexicalities we are looking at are the only possible ones. Furthermore, we are not describing a historical process, but rather a variety of contexts in which *bike lanes* occurs and which its use can thus evoke. Table 3 summarizes the indexical meanings of bike lanes in our data.

Indexical order	Overview	Pro-bike lane use	Anti-bike lane use
1st	space, physical appearance, separation of modes of transport	Bike lanes are areas on roads for bicycle traffic.	Bike lanes are areas on roads taken away from car traffic, parking.
2nd	pragmatic functions, effects	Bike lanes provide comfort and safety for people traveling by bicycle, relieve traffic congestion, encourage healthy transportation.	Bike lanes encourage cycling on roads, which is dangerous and risky. Bike lanes are inconvenient for drivers, disrupt traffic flow.
3rd	social identities: characteristics of bike lane users	People who use bike lanes are often young, progressive commuters, but can include recreational riders and families with children.	People who use bike lanes are a few young, progressive, white newcomers, not the majority of Pittsburghers, not traditional Pittsburghers.
4th	characteristics of a city that includes bike lane users	A city that builds bike lanes is concerned with attracting young newcomers, who often work at tech companies. Such a city is progressive; modern.	A city that builds bike lanes ignores long-time residents and their interests, doesn't value the past.

Table 3: Indexical meanings of *bike lanes* in our corpus

First order of indexicality: bike lanes indexes physical space

Bike lanes are often talked about simply as traffic lanes restricted to cyclists. On this level, *bike lanes* evokes stretches of asphalt, possibly painted in a distinctive way and/or separated from other lanes with bollards or curbs. But asphalt and paint can only be interpreted as bike lanes within an already understood system in which people using different modes of movement (walking, driving, cycling) are expected to be physically separated, and in which bicycles are understood as a mode of transportation (rather than simply a toy or a weekend activity). On this level, bike lanes index physical barriers: bike lanes separate bicyclists and car drivers. For example, an article on a TV station's website about the 2014 protected bike lanes on Penn Avenue in downtown Pittsburgh quotes the mayor reminding people of this basic indexical meaning (framed in positive terms for drivers), that bike lanes take "cyclists out of the lanes of automobiles" (Ingram, 2014). Other examples of *bike lanes* used in the context of talk about their physical aspects include these:

Bike lane expansion will continue for the next eight years, using a few hundred miles of bike lanes to connect many of the city's 88 neighborhoods (Ingram, 2015)

The city's second protected bike lane is nearing completion. Parallel parking separates the bike lanes from traffic adjacent to Phipps Conservatory. Parking in the bike lane is not legal ... (Lupinacci, 2014)

Second order of indexicality: bike lanes indexes pragmatic function

An n th-order indexical becomes an $(n+1)$ st order indexical by being reinterpreted according to a new ideological schema. One such ideological schema is that objects in the built environment have purposes. (This ideological schema is challenged in conceptual art projects that present objects with no apparent purposes.) This leads people to expect that there are reasons for creating separate space for cyclists on the road. One reason commonly voiced by groups advocating for cyclists is that people cycling in bike lanes are less likely to be hit by cars than in mixed lanes (Park et al., 2015). *Bike lanes* often appears in the context of talk about safety. For example, a letter to the editor in the *Pittsburgh Post-Gazette* claims that “The fact of the matter is that bike lanes save lives. They help keep Pittsburghers healthy” (Boerer, 2017). On the anti-bike lane side, claims about safety can be challenged, as in this quote from an interview with one of the mayor's primary election opponents, Darlene Harris: “No, it's not about not liking bike lanes. It is about – there have not been safety studies done or traffic studies done” (Sheehan, 2017). Anti-bike lane writers also talk about pragmatic functions other than safety that bike lanes might interfere with, as does this online commenter: “What will these bike lanes do to help the endless traffic jam downtown? Probably [nothing]” (Schmitz, 2014). Another way of challenging the link between bike lanes and safety is to talk about the danger that cyclists pose to others by not following traffic laws. One commenter on a *Pittsburgh Post-Gazette* article notes that cyclists “never stop at stop signs, red lights and most of you dont even use your turn signals. What happens if you happen to hit me in my vehicle with your bike? are you insured?” (Zullo, 2014). Another commenter writes, “I guess several cyclists on Smallman Street don't know [they must follow traffic laws], because it has created some dangerous situations at stop signs” (Zullo, 2014). These comments were both rebuffed by other commenters who talked about the vulnerability of cyclists and claimed that car drivers also create dangerous situations, reclaiming the issue of safety for bike lane supporters.

Third order of indexicality: bike lanes indexes social identity

As Ochs points out in a study of indexicality in gender socialization (1992), the use of a particular form (for example, tag questions) for a particular function (expressing uncertainty) can be interpreted as indexing a social identity (female gender). The third-order indexical use of *bike lanes* is in the context of talk about those who are seen as using or benefiting from bike lanes. These are often understood as young, progressive, tech-oriented newcomers to Pittsburgh. The in-migration of these newcomers, often seen as being attracted by tech companies, has received some positive attention for its role in revitalizing Pittsburgh's post-industrial economy (Beauregard et al., 1992). The mayor brings up bike lanes in the context of this group of users in a 2015 news article, where he is quoted as claiming that “bike lane expansion is a necessary component to urban lifestyle, mainly because new corporate residents want it—like Google.” (Ingram, 2015).

However, the influx of educated, white, young newcomers is also charged with raising housing costs, displacing longtime residents (particularly African Americans), and changing the culture of neighborhoods (Brown, 2016). Bike lane opponents use *bike lanes* in the context of talk about these issues. In a 2014 WTAE article about the downtown protected bike lanes, a resident is quoted as saying “the needs of the many were sacrificed for the needs of a few” (Ingram, 2014), reinforcing a separation between longtime residents, assumed to drive cars, and a privileged few, young tech-oriented newcomers. One of the mayor’s opponents in the primary election, Rev. John C. Welch, used *bike lanes* in this context when he was quoted as saying, “While I like bike lanes, not many of us use them” (Shewczyk, 2017). Here, *us* refers to native Pittsburghers, to African American Pittsburghers (Welch is African American), or both.

Though there is a general acceptance of young, white, tech-oriented newcomers as prototypical users of bike lanes, some pro-bike lanes texts wish to expand this notion of who benefits from bike lanes. A blog post from the bike industry lobbying group PeopleForBikes quotes a member of the Pittsburgh community who sees the new bike lanes making it “easy for families and casual riders to get downtown” (Andersen, 2014). Likewise, the planning department director for Pittsburgh states in a press release from the mayor’s office that protected bike lanes “open up biking to a broader constituency of people who live, work, and visit” (Lupinacci, 2014). Similarly, one of Mayor Peduto’s television advertisements featured children riding in the downtown protected bike lane. Like each of these identified indexical orders, the sentiment and nature of association with bike lane users is a site of contention between those who support and those who oppose bike lanes.

Fourth order of indexicality: *bike lanes* indexes the 21st-century city

A further order of indexicality abstracts the notion of who uses bike lanes to what kind of city attracts these users by implementing bike lanes. In a *Post-Gazette* article about the mayor’s “bike lane vision,” Mayor Peduto is quoted talking about bike lanes in the context of urban planning: “tech companies ... ask for safe streets and to be able to ride a bike to work. Twenty-first century cities are being designed so that people don’t have to own a car to be able to live and work in a city” (Smeltz, 2017). This frames bike lanes as something that tech companies, understood as relative newcomers to Pittsburgh, desire. It also frames bike lanes as something forward-looking, something that up-to-date cities are doing. *Bike lanes* is also used in the context of talk about economic recovery: “bike lanes are part of the next step in Pittsburgh’s recovery from rust-belt collapse” (Andersen, 2014); “bike lanes should encourage redevelopment” (Smeltz, 2017). On the other side of the issue, people are quoted as saying that the focus on bike lanes comes at the expense of other, more important infrastructure issues, such as repairing the city’s aging water system: “Peduto is ‘putting bike lanes over the health of city residents.’” (Deto, 2017). Furthermore, those against bike lanes see them as being mandated by city government despite the fact that residents do not want them, being “pushed on this city and no one had a vote on it,” as one resident remarks (Shoemaker, 2017).

Using this taxonomy, we coded every instance of *bike lanes* in the corpus (N=216) as evoking and reinforcing none, one, or more of these indexical orders. Since the immediate contexts of many instances of *bike lanes* referred to more than one

indexical order, many instances were given multiple codes. For example, the immediate context of an instance of *bike lanes* that mentions safety, attracting young professionals, and economic advantage for top-tier cities was coded for 2nd-, 3rd- and 4th-order associations. We also noted whether the sentiment toward bike lanes that was being expressed in the selection was positive, negative, or neutral.

Findings

Our concordance of every instance of *bike lanes*, annotated with sentiment and indexical orders, allows quantitative analysis of the relationships among these annotated variables. This analysis explores how discursive associations around *bike lanes* are reinforced and challenged, organizing these associations by indexical order. It allows us to see patterns of variation in how different groups' use of *bike lanes* might result in people talking past each other, with opponents wondering what could possibly be good about bike lanes and proponents wondering what could possibly be wrong with them. People on both sides of the issue could say that their attitudes about the mayor were linked to bike lanes, but they would be calling up very different connotations of the phrase.

To first give an overview of the distribution of annotated variables, most instances of *bike lanes* in our corpus had a positive sentiment toward the term (see Table 4). Furthermore, most instances of *bike lanes* operated on the second order of indexicality, that of function. Predictably, documents about the installation of protected bike lanes in 2014 and talk about bike lanes in the mayoral race included more mentions of *bike lanes* than did articles about the crash of Dennis Flanagan in 2016, where (the lack of) bike lanes was more indirectly associated with the details of the event. Our next analysis considers the relationships between these coded variables.

Sentiment	Number of <i>bike lanes</i> instances
Positive	113
Negative	48
Neutral	55
Indexical order	
1st	81
2nd	87
3rd	17
4th	60
Event	
2014 Protected Bike Lanes	97
2016 Dennis Flanagan crash	28
2017 Mayoral Race	89

Table 4. Number of instances of *bike lanes* coded for sentiment, indexical order, and event.

The nature of the event in which *bike lanes* is mentioned varies with sentiment (Figure 1, illustrating data in Table 5). As might be expected, positive sentiment toward instances of *bike lanes* are most frequent relative to negative and neutral instances in texts about the 2016 death of cyclist Dennis Flanagan (with the argument that bike infrastructure could help prevent such crashes). Negative instances of *bike lanes* are most common in texts about the issue in the 2017 mayoral race, where concerns about bike lanes emboldened the mayor's two challengers.

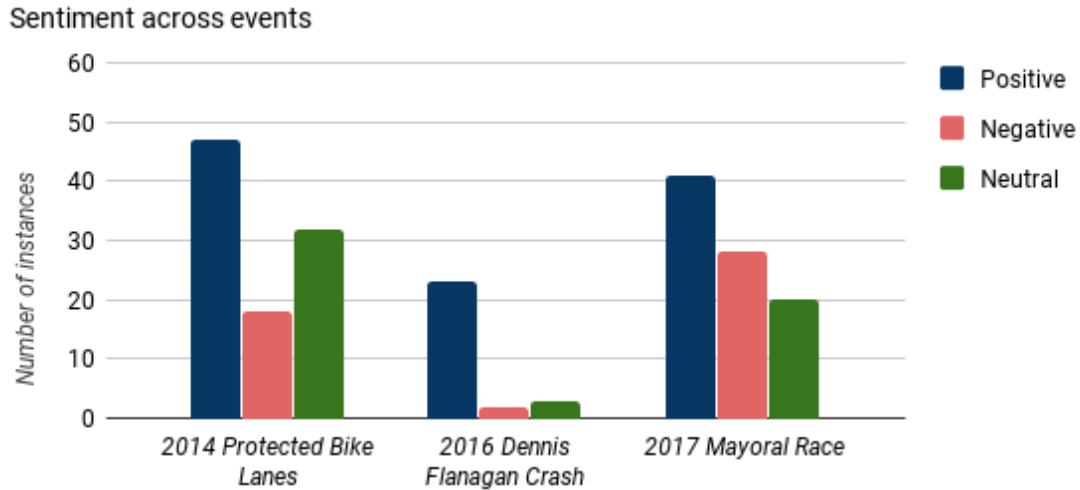


Figure 1: Sentiment across events

Sentiment	2014 Protected Bike Lanes	2016 Dennis Flanagan Crash	2017 Mayoral Race
<i>Positive</i>	47	23	41
<i>Negative</i>	18	2	28
<i>Neutral</i>	32	3	20

Table 5. Number of instances of *bike lanes* organized by sentiment and event

Considering the topic of articles in which bike lanes are mentioned also affects the distribution of indexical orders (Figure 2, illustrating data in Table 6). Unsurprisingly, talk about the 2014 protected bike lanes mostly associates *bike lanes* with details of physical implementation, whereas *bike lanes* are often indexed on the second order (function, i.e. safety) in articles about the death of Dennis Flanagan. Content about the 2017 mayoral race operates mostly on the fourth order, *bike lanes* indexing the characteristics of a city containing them, and thus competing visions of the city’s future.

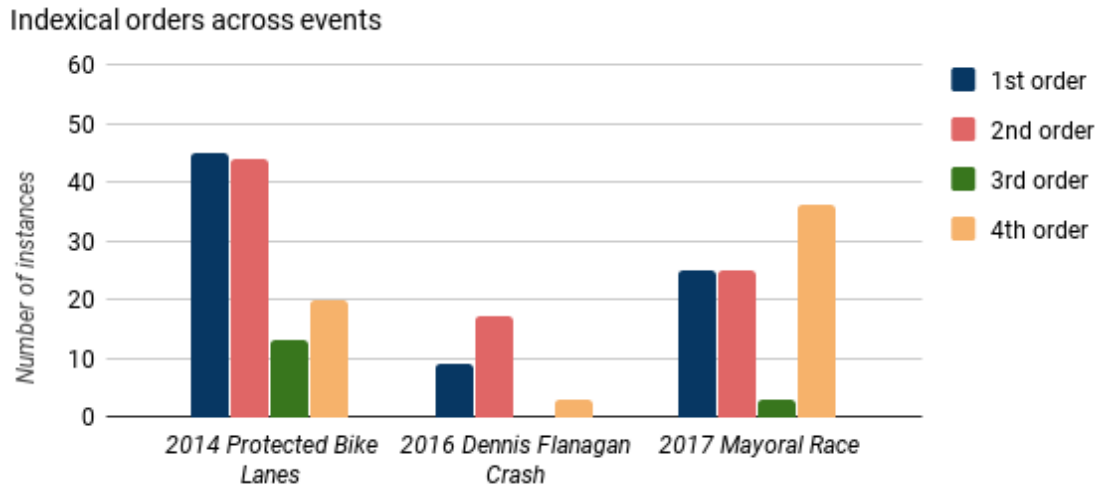


Figure 2. Distributions of indexical orders across events

Indexical order	2014 protected bike lanes	2016 Dennis Flanagan crash	2017 mayoral race
<i>1st</i>	45	9	25
<i>2nd</i>	44	17	25
<i>3rd</i>	13	0	3
<i>4th</i>	20	3	36

Table 6. Number of *bike lanes* instances organized by order and event

The discourse of both proponents and opponents of bike lanes operates at all indexical orders, but writing about bike lanes in a positive, negative or neutral manner each had different distributions of these indexical orders (see Figure 3, illustrating data in Table 7).

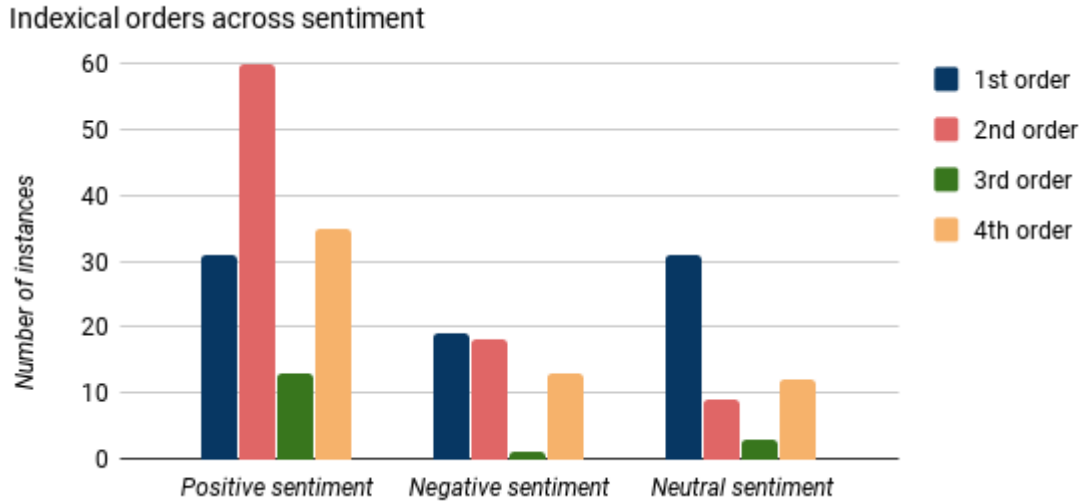


Figure 3. Distributions of indexical orders across sentiment

Indexical order	Positive sentiment	Negative sentiment	Neutral sentiment
<i>1st</i>	31	19	31
<i>2nd</i>	60	18	9
<i>3rd</i>	13	1	3
<i>4th</i>	35	13	12

Table 7. Order distribution across sentiment

Instances of *bike lanes* where sentiment was positive most commonly associated bike lanes with the second indexical order, that of pragmatic function (43% of positive instances). These instances often included references to rider safety, reinforcing this discursive association with *bike lane*. For example, the National Public Radio news station in Pittsburgh, WESA, begins an article about the 2014 protected bike lanes with, “Cyclists in Pittsburgh can worry about one less street when it comes to rider safety” (Routh, 2014). Positive-sentiment instances of *bike lanes* also more often carried associations on the third indexical order, speaking about the kinds of people who use bike lanes, than did instances with negative or neutral sentiment. This often was talk about the ability of safe bicycle infrastructure to expand the pool of people who would be comfortable cycling on the street. In the same WESA article, a cycling advocate is quoted, “Through more protected bike lanes and other bike infrastructure, more people will be willing and able to try [cycling]” (Routh, 2014).

In contrast, instances of *bike lanes* with negative sentiment were more likely to operate at the first order of indexicality, about the physical implementation of bike lanes, than were positive instances. They took issue with bike lanes' use of space and resources. Pennsylvania Department of Transportation official Dan Cessna noted that there was not room to meet demands for bike lanes in the redesign of West Carson Street on which Dennis Flanagan was later killed (Iannotti, 2016). The *Pittsburgh Tribune-Review* ran an article solely about the cost of police patrol for downtown bike lanes newly installed in 2014. Negative discussion of bike lanes at the second-order level of function stressed not safety but driver inconvenience and disruption of traffic flow. A local TV station story about the downtown bike lanes noted drivers being "mixed up" (Ingram, 2014). Mayoral candidate Welch claims that bike lanes as implemented in Pittsburgh "are not safe for cyclists" (Mayo, 2017), actively working against the association of safety with bike lanes. Instances with negative sentiment also more commonly operate at the fourth-order level of what kind of a city implements bike lanes (27% of negative instances, a higher percentage than in positive or neutral cases). Comparing the city's focus on bike lanes to issues affecting the health of more Pittsburghers, such as lead contamination in city water, is a common critique at this level, Welch challenging the incumbent mayor for "misplaced priorities" (Deto, 2017). Note the dramatic difference in association from bike lane advocates, who stress the importance of bike lanes for exactly the same issues: the safety and health of residents. The fourth order of indexicality is also where a link to gentrification and longtime residents being left behind is often made. This is sometimes phrased as the city government "pushing" bike lanes on communities that have little control to limit them (Shoemaker, 2017) or in describing a communication issue where "communities have not been talked to" (Mayo, 2017).

Neutral instances of *bike lanes* most often operate at the first order of indexicality (56% of instances), describing the physical implementation of space for cyclists. However, texts that take a neutral stance toward bike lanes also often talk about the controversy, operating at the fourth indexical order without taking a side. One online commenter wrote, "Are we still talking about a bike lane here?" after heated discussion broke out about mayoral elections in the comment thread for a *Post-Gazette* article about the 2014 downtown bike lanes (Schmitz, 2014).

In this quantitative exploration, we find that our concordance analysis annotated for indexical order is useful in describing how discourse operates across groups with different political interests. We also find that what *bike lanes* indexes depends strongly on the topic of the discourse.

Discussion and conclusion

Because *bike lanes* can index different contexts, people can be using the term in different ways even when they appear to be talking about the same thing. This happens especially when the issue of bike lanes becomes political. For example, when Rev. Welch (quoted above) says "While I like bike lanes, not many of us use them," *bike lanes* is probably meant to index the function of bike lanes, safety (this would be why someone who doesn't use bike lanes would like them anyway) and probably not meant to index the users of bike lanes, since they are not "us." In another article (Rogers, 2017) the mayor is

quoted satirically listing the reasons why he might not be re-elected: “Refugees – we’re a sanctuary city; Bike lanes – people hate bike lanes; Robot cars.” Here, *bike lanes* seems to have multiple indexical meanings: “people” don’t like any of the things *bike lanes* can point to, from their physical existence to their users (liberals who would welcome immigrants) to their connection with the progressive 21st-century city that supports the self-driving car industry. When Pittsburgh implemented the first downtown protected bike lanes in 2014, the director of Bike Pittsburgh, Scott Bricker, remarked that the project was the “pinnacle of his career,” most likely pointing to both bike lanes’ connection with safety and to progress toward his conceptualization of a modern city. In a later *Pittsburgh Post-Gazette* article, Bricker refers to bike lanes as “bikeways and safe bike infrastructure” (Smeltz, 2017). The only adjective Bricker associates with bike lanes here is the word *safe*. Bricker goes on to say that some have used bike lanes as a “political wedge,” which acknowledges the existence of indexical meanings other than safety. His reference to bike lanes with alternative language such as “bikeways” and “bike infrastructure” may also serve to distance bike lanes from these political implications. In an incident that took place during the 2017 mayoral primary campaign, a cyclist wearing a camera was involved in an altercation with a driver who told him to “stay in the damn bike lane” (Sheehan, 2017). This became newsworthy when it was discovered that the driver was one of the mayor’s opponents in the race, Darlene Harris. Interestingly, the incident occurred on a street without a bike lane; the presence of the driver and the cyclist in the same lane of traffic was the reason for the dispute. Arguably, *bike lanes* here indexes not a physical separation of modes of transportation but only the association of bike lanes with inconvenience for drivers.

Our approach not only allows us to see what contexts *bike lanes* calls up, but also what fails to be called up as the term is used. As the meaning of *bike lanes* moves to ever higher levels of abstraction, certain groups of people are ideologically “erased,” made invisible in or irrelevant to the city’s imagined future. Indexicals point to contexts in which they frequently occur, and newer, younger residents may be more likely to get around by bicycle. But this association is also ideological. Linguistic anthropologists Irvine and Gal (2000) describe the processes of *iconization* and *erasure* in ideology. According to the third-order indexical links we have described, young, white, male techies become the icon of urban cycling as a lifestyle choice (visibly present in the featured photo attached to the Smeltz, 2017, *Post-Gazette* article). This iconization necessarily excludes other groups who take advantage of this affordable means of transportation, such as “invisible cyclists,” people of color who cycle from necessity (Lam, 2017). Erasure is present here in the experiences of many in Pittsburgh who are not young millennials who work for tech companies but longtime residents who cycle for affordability and health: Dennis Flanagan, killed in 2016 while cycling, is one example.

In examining the variety of indexical associations of the phrase *bike lanes*, our project contributes to research on the rhetoric of words and phrases like “Tiananmen Square” or “Rodney King” that call up particular narratives in news discourse (Bennett and Lawrence, 1995; Lee et al., 2011; Phillips, 2016) or “ideographs” like “liberty,” “democracy,” or “family values” that point to sets of values without actually specifying them (Cloud, 1998; McGee, 1980). Phillips shows how “narrative icons” can evoke multiple frames, but otherwise the common assumption in this body of work is that words

and phrases like these come to be associated with the same version of a narrative or the same set of moral values. We use the concept of indexicality to demonstrate that, particularly in political discourse, a particular word or phrase can call up multiple contexts. Furthermore, we see these various indexicalities being reinforced or challenged in discourse depending on the topic and interest of the group writing.

Like ideographs, *bike lanes* can index widely held moral values, such as the need for safety for road users. However, we have shown that the term indexes meanings at multiple levels of abstraction, and has different associations for different groups and across contexts, which differs from the often hegemonic, one-dimensional values associated with ideographs. Bennett and Lawrence (1995) show how reporting about an ill-fated barge full of garbage that nobody would accept led to “the mainstreaming of social change,” as subsequent news discourse called increasing attention to the garbage crisis and the value of recycling. In the discourse we have examined, on the other hand, *bike lanes* becomes a symbol of difference, as opposing groups use the phrase to index different sets of values. Unlike narrative icons, *bike lanes* does not refer to a particular narrative. But it works similarly, asking readers to fill in a set of background assumptions. For instance, the *Pittsburgh Post-Gazette*’s article about Mayor Peduto’s 2017 win quotes a resident who notes that “people are more concerned about bike lanes than he gives them credit for, and about the whole water thing.” The article goes on to explain that “the whole water thing” is “a reference to ongoing problems with lead contamination,” but leaves “concerned about bike lanes” unspecified, allowing readers to fill in why bike lanes might be controversial (Potter, 2017).

Our corpus spans a relatively limited period of four years and the texts are closely linked to the three specific events we chose to focus on. For these reasons, we are unable to see how indexical meanings attached to *bike lanes* have changed over time in Pittsburgh. An analysis of the indexical meanings of *bike lanes* over time with an expanded corpus may give insight into the historical process of developing indexicalities in discourse, from the concrete implementation of bike lanes to their abstract association with cities of the future.

Notes

1. During the primary election, each party’s candidates are elected to run against other parties’ candidates in the November general election. But since a huge majority of Pittsburgh’s residents reliably vote for Democrats, the mayor and other city officers are in effect the people who win in the Democratic primary election. In the 2017 general election the incumbent mayor, who won the Democratic primary election, ran unopposed.
2. The second author was a canvasser who experienced this and compared notes about it with canvassers and their supervisors in the campaign office.
3. There were, in fact, issues that seemed larger than whether Peduto supported bike lanes or not, in the sense that they affected more people. These included high levels of lead in the city’s water and an escalating controversy about affordable

housing that pitted poorer, longer-term Pittsburghers against real-estate developers and wealthy newcomers.

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References

- Andersen M (2014) Business leaders cheer protected bike lanes into busy downtown Pittsburgh. In: *PeopleForBikes Blog*. Available at: peopleforbikes.org/blog/business-leaders-cheer-protected-bike-lanes-into-busy-downtown-pittsburgh/ (accessed 26 Sept 2017).
- Anthony L (2014) AntConc (Version 3.4.3) [Computer Software]. Tokyo, Japan: Waseda University. Available at: www.laurenceanthony.net (accessed 7 May 2017).
- Baker P (2006). *Using Corpora in Discourse Analysis*. London: Continuum.
- Baker P (2010). Representations of Islam in British broadsheet and tabloid newspapers 1999-2005. *Journal of Language and Politics* 9(2): 310–38.
- Beauregard RA, Lawless P, and Deitrick S (1992). Collaborative strategies for reindustrialization: Sheffield and Pittsburgh. *Economic Development Quarterly* 6(4): 418–430.
- Bennett WL and Lawrence RG (1995). News icons and the mainstreaming of social change. *Journal of Communication* 24(3): 20–39.

- Bike Pittsburgh (2017) Bicycle pavement markings, 1980 to present. Available at: docs.google.com/spreadsheets/d/1JvsBRbTE9-4au-eEVgLzrRhSUal-juSfeNT2bcoekoU/pub?single=true&gid=0&output=html (accessed 9 May 2017).
- Blazina E (2017) Pittsburgh won't install bike lanes on Fort Pitt Boulevard, reviews trail connection. *Pittsburgh Post-Gazette*, 1 May.
- Boerer E (2017) Peak ridiculousness: Bike lanes shouldn't be a wedge issue. *Pittsburgh Post-Gazette*, 24 May.
- Brown C (2016). *When hipster meets history: Businesses and gentrification in the Lawrenceville neighborhood of Pittsburgh* PhD Thesis, American University, USA.
- Bucholtz M and Hall K (2005). Identity and interaction: A sociocultural linguistic approach. *Discourse Studies* 7(4-5), 585–614.
- Chilton P (2004). *Analysing political discourse: Theory and practice*. Routledge.
- Cloud DL (1998). The rhetoric of <family values>: Scapegoating, utopia, and the privatization of social responsibility. *Western Journal of Communication* 62(4): 387–419.
- Cloud DL (2004). “To veil the threat of terror”: Afghan women and the <clash of civilizations> in the imagery of the U.S. war on terrorism. *Quarterly Journal of Speech* 90(3): 285–306.
- Deto R (2017). Bike-advocacy group takes issue with mayoral candidate John Welch's comments on bike lanes. In: *Pittsburgh City Paper PolitiCrap*. Available at: www.pghcitypaper.com/PolitiCrap/archives/2017/03/29/bike-advocacy-group-takes-issue-with-mayoral-candidate-john-welchs-comments-on-bike-lanes (accessed 26 Sept 2017).
- Fairclough N (1989) *Language and Power*. London: Longman.

- Iannotti R (2016) Bicyclists call for more biker-friendly streets after West End fatal accident. *KDKA News*, 6 Sept.
- Ingram S (2014) City bike lanes grow; frustration too. *WTAE: Pittsburgh Action News*, 5 Sept.
- Ingram S (2015) Bike lane expansion to last 8 years in Pittsburgh. *WTAE: Pittsburgh Action News*, 24 July.
- Irvine JT and Gal S (2000) Language ideology and linguistic differentiation. In: Kroskrity PV (ed) *Regimes of Language: Ideologies, Politics, and Identities*. Santa Fe, NM: School of American Research Press, pp.35–84.
- Johnstone B (2010). Locating language in identity. In: Llamas C and Watt D (eds) *Language and Identities*. Edinburgh: Edinburgh University Press, pp.3–26.
- Kirkham S and Moore E (2015). Constructing social meaning in political discourse: Phonetic variation and verb processes in Ed Miliband’s speeches. *Language in Society* 45(1): 87–111.
- Lam TF (2017). Hackney: a cycling borough for whom? *Applied Mobilities*. Epub ahead of print 10 Apr 2017. DOI: 10.1080/23800127.2017.1305151.
- Lee C, Li H, and Lee FLF (2011). Symbolic use of decisive events: Tiananmen as a news icon in the editorials of the elite U.S. press. *International Journal of Press/Politics* 16(3): 335–356.
- Lupinacci M (2014) Construction continues of Pittsburgh’s latest protected bike lanes. In: Peduto for Pittsburgh Mayor. Available at: billpeduto.com/2014/08/30/construction-continues-of-pittsburghs-latest-protected-bike-lanes (accessed 9 September 2017).
- Mayo B (2017) Pittsburgh mayor's race debate tackles immigration, bike lanes, drinking water safety. *WTAE: Pittsburgh Action News*, 26 Apr.

- McGee MC (1980). The ideograph: A link between rhetoric and ideology. *Quarterly Journal of Speech* 66(1): 1–16.
- Ochs E (1992) Indexing gender. In: Duranti A and Goodwin C (eds) *Rethinking Context: Language as an Interactive Phenomenon*. Cambridge University Press, pp.335–358.
- Park J, Abdel-Aty M, Lee J, and Lee C. (2015) Developing crash modification functions to assess safety effects of adding bike lanes for urban arterials with different roadway and socio-economic characteristics. *Accident Analysis & Prevention* 74: 179-191.
- Peirce CS (1960). Division of signs. In: Hartshorne C, Weiss P and Burks AW (eds). *Collected Papers of Charles Sanders Peirce*. Cambridge: Belknap Press of Harvard University Press.
- PeopleForBikes (2017) The PlacesForBikes definition of a protected bike lane. PeopleForBikes. Available at: www.peopleforbikes.org/placesforbikes/pages/the-placesforbikes-style-guide#pbldefinition (accessed 10 May 2017).
- Phillips D (2016). *Police brutality in news media: Narratives and narrative icons as argumentation and markers of communal identity*. PhD Thesis, Carnegie Mellon University, USA.
- Pittsburgh Department of Public Works (2017). Street resurfacing. Available at: pittsburghpa.gov/dpw/street-resurfacing (accessed 9 May 2017).
- Potter C (2017). Peduto easily defeats two primary election rivals. *Pittsburgh Post-Gazette*, 16 May.
- Rogers G (2016). Pittsburgh mayor gives 3 reasons he won't be re-elected. *Eno Transportation Weekly*, 6 Oct.
- Routh J (2014). City to install Penn Avenue bike lane. *WESA: Pittsburgh's NPR News Station*, 3 Sept.

- Schmitz J (2014) Pittsburgh to start work on bike-only lanes next week. *Pittsburgh Post-Gazette*, 8 Sept.
- Sheehan A (2017) 'Stay in the damn bike lane': Mayoral candidate makes no apologies for confrontation with bicyclist. *KDKA News*, 4 May.
- Shewczyk A (2017) Bike lanes under attack during this mayoral race. In: Bike Pittsburgh Blog. Available at: www.bikepgh.org/2017/03/29/bike-lanes-under-attack-during-this-mayoral-race/ (accessed 26 Sept 2017).
- Shoemaker JD (2017). After primary win, Bill Peduto is poised to serve a second term as Pittsburgh's mayor. *Public Source*, 16 May.
- Silverstein M (1985) Language and the culture of gender: At the intersection of structure, usage, and ideology. In Mertz E and Parmentier RJ (eds) *Semiotic Mediation: Sociocultural and Psychological Perspectives*. Orlando, FL: Academic Press, pp.219–259.
- Silverstein M (2003). Indexical order and the dialectics of sociolinguistic life. *Language and Communication* 23(3): 193–229.
- Smeltz A (2017) Despite 'bikelash,' Pittsburgh mayor stands behind bike lane vision. *Pittsburgh Post-Gazette*, 5 Mar.
- Van Dijk TA (2002). Ideology: Political discourse and cognition. In Chilton PA and Schäffner C (eds) *Politics as Text and Talk*. Amsterdam: John Benjamins Publishing Company.
- Zullo R (2014) Pittsburgh ready to roll with bike lanes. *Pittsburgh Post-Gazette*, 9 May.