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SLICING THE SOCIAL PIE: HOW SCARCITY AND COMPETITION SHAPE SYMBOLIC  
ZERO-SUM BELIEFS

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## ABSTRACT

The economic and social structures that we live in are often based on winners and losers, haves and have nots, those who belong and those who don't. The tendency to view situations along these terms, where one person's gain comes at the cost of someone else's loss, is referred to as zero-sum thinking. But it does not always have to be this way. In my dissertation, I explore zero-sum beliefs for material resources (e.g., money, physical items) where there could be a real limit and *symbolic* resources (e.g., love, respect) where there shouldn't be a limit. In Chapter 1, I examine how adults and children think about symbolic resources and find that symbolic zero-sum beliefs are naturally lower than material zero-sum beliefs, but also are malleable to changes in renewability. In Chapter 2, I demonstrate that competitive work environments not only increase material zero-sum beliefs, but also make symbolic resources feel more zero-sum as well. In Chapter 3, I show how organizations can either reduce or increase competitive zero-sum thinking by emphasizing resource abundance or limitation. Overall, these findings further our understanding of zero-sum thinking and have implications for fostering more cooperative social environments.

## Introduction

When we think about the development and evolution of natural life on Earth, a fundamental principle across all organisms is the competition for limited resources. Whether it is trees trying to outgrow each other to reach sunlight, male buffalos fighting to the death over a mate, or competition between sponges and corals for food in an ocean reef, the individuals that are most successful at acquiring resources for themselves are also those most likely to survive and reproduce. Although we often think of human societies as being far more advanced and plentiful than those of trees, buffalo, and coral, competition for resources is just as, or perhaps even more so, salient for us as it is for them. Not only do humans compete for basic resources such as food, mates, and shelter, we have also created economic and social structures where success is based on winners and losers, havers and have-nots, those who belong and those who do not. Given the near ubiquitous nature of competition in our everyday lives, social scientists have invested decades of work in understanding how our perceptions of our environments are shaped by it.

One psychological consequence that has received considerable attention has been zero-sum thinking. Originally derived from economic game theory, a zero-sum game is defined as the situation in which one person's gain is equivalent to another's loss (Von Neumann & Morgenstern, 1944). While a zero-sum game refers to the situation itself, zero-sum thinking instead refers to the psychological construct - a person's subjective interpretation of a situation as being zero-sum. There are numerous examples in popular culture where zero-sum views define how people see the world. Increased economic power for China is often seen as leading to diminished economic power for the United States. A win for Republicans means a loss for Democrats. Progress for same-sex marriage encroaches upon the traditional meaning of

marriage. Academic institutions accept a certain number of students every year, such that one applicant's acceptance means one less "slot" for another. Here I will investigate how broadly and pervasively these zero-sum intuitions extend. Specifically, my dissertation will investigate whether people treat symbolic resources (like trust, respect, popularity, and love) as zero-sum as well as the contextual factors that might make one view such resources as zero-sum or non-zero-sum. Before getting to this research question, I briefly review some relevant findings on zero-sum thinking.

### **Evidence for Zero-sum thinking**

Zero-sum thinking appears to pervade many aspects of people's daily lives and the human tendency towards zero-sum thinking is also seen in empirical work across a number of domains. In negotiations, participating parties will often assume that their interests are diametrically opposed and that wins for one side mean losses for another (Bazerman, 1983; Thompson & Hastie, 1990). In folk economics, people often believe that an economy can only support a fixed amount of jobs, a faulty assumption that is referred to as the lump of labor fallacy (Walker, 2007). People also tend to see wealth as zero-sum even though many economic theories suggest that as economies grow, the overall "pot" of wealth can grow through technological advances and larger markets (Sirola & Pitesa, 2017; de Condorcet, 1955).

Zero-sum mindsets are also seen within our academic and legal institutions. College students often assume that grades are zero-sum, such that when some students earn higher grades, there are fewer high grades available for other students. This has even been shown to exist in courses where the explicit grading policy is the opposite, such that students are actually graded based on their performance relative to a pre-existing standard of quality (Meegan, 2010).

And when evaluating legal evidence, jurors also tend to see (erroneously) explanations for events as zero-sum, such that evidence supporting one hypothesis must disconfirm other hypotheses (Pilditch et al., 2019). More broadly, it has also been found that people hold a win-win denial view of exchange. When reading about simple exchanges of goods and services (e.g., buying a car, getting a haircut), people often see buyers as less likely to benefit from transactions than sellers, and view gains for one as leading to losses for another. This ignores the simple fact that parties usually only enter exchanges if they see a benefit for themselves (Johnson et al., 2022). Altogether, there is a robust body of evidence showing that zero-sum mindsets are common in how people perceive relationships, exchanges, and resources in their environment.

### **Consequences of Zero-Sum beliefs**

Perceiving situations to be zero-sum leads to a number of adverse consequences at both the individual and societal level. Zero-sum thinking is associated with diminished well-being, greater cynicism, less trust for others, and reduced faith in social systems (Rózycka-Tran et al., 2021; Rózycka-Tran et al., 2019; Shin & Kim, 2018; Davidai & Ongis, 2019). In negotiations, parties who believe that their interests are at odds with their counterparts' interests often overlook mutually beneficial outcomes (Thompson, 1991), discredit advantageous offers from the other side (Ross & Ward, 1995), and fail to reach "win-win" situations (Thompson & Hrebec, 1996). Individuals who hold a zero-sum construal of success are less likely to help others succeed on their own and more likely to take dominance-oriented strategies towards gaining rank (Sirola & Pitesa, 2017; Chernyak-Hai & Davidai, 2022; Andrews-Fearon & Davidai, 2022). In the domain of intergroup relations, zero-sum beliefs about group hierarchies have also been shown to lead to greater prejudice. People who hold stronger zero-sum beliefs about jobs, such that immigrants are taking jobs away from native residents, show reduced

support for pro-immigration policies (Esses et al., 2001). Men who hold zero-sum views about gender (gains for women lead to losses for men) show reduced support for gender equity policies (Kuchynka et al., 2018; Ruthig et al., 2021). Similarly, Whites who hold zero-sum views about race (gains for Blacks lead to losses for Whites) show reduced support for racial equity policies (Wilkins et al., 2015). And finally, Christians who hold zero-sum views about LGBTQ groups (LGBTQ success comes at the expense of Christians) show reduced support for LGBTQ rights (Wilkins et al., 2022). In contrast, perceiving social issues such as racial relations as non zero-sum actually increases support for policies that aim to resolve racial inequality (Stefaniak et al., 2020). All in all, there is a diverse and large body of research indicating that zero-sum thinking not only gets in the way of cooperation and positive outcomes, but also is a powerful driver of hostile interactions and group dynamics.

### **Determinants of Zero-Sum Beliefs**

Given the prevalence of zero-sum thinking and the harm that it poses, it is critical to understand its underlying causes. At the individual-difference level, individuals with greater social dominance orientation, higher trait competitiveness, and lower socioeconomic status show greater zero-sum views (Esses et al., 2001; Andrews-Fearon & Davidai; 2022; Rózycka-Tran et al., 2015). Group membership influences zero-sum beliefs as well. Men, compared to women, are more likely to see gender relations as zero-sum, such that gains for women lead to losses for men (Kehn & Ruthig, 2013; Kuchynka et al., 2018). Whites, compared to Blacks, are more likely to see reduced anti-Black bias as being offset by increasing anti-White bias (Norton & Sommers, 2011). And finally, Christians, compared to both LGBTQ and other non-Christian participants, are more likely to see decreasing discrimination against LGBTQs as being offset by increasing discrimination against Christians (Wilkins et al., 2022).

It has also been shown that zero-sum beliefs are malleable, context dependent, and do not necessarily reflect a generalized mindset. For example, when social and economic issues are framed as challenging status quo, conservatives are more likely (compared to liberals) to see it as zero-sum. In contrast, the same issue, but framed as maintaining status quo, was more likely to be seen by liberals as zero-sum (Davidai & Ongis, 2019). Employees who learn that the economy is experiencing downturn are more likely to hold a zero-sum construal of success and less likely to help their colleagues (Sirola & Pitesa, 2017). When individuals are made to feel personally deprived from having to compare themselves to better-off others, they also see success as more zero-sum (Ongis & Davidai, 2021). And when reading about romantic relationships, love is seen as more zero-sum in monogamous relationships than it is in open relationships (Burleigh et al., 2016).

People are also much more likely to see things as zero-sum when they feel threatened. When reading about immigrants, native residents are more likely see to a zero-sum relationship for jobs (immigrants are taking jobs from native residents) after they read a story about immigrant success in a difficult economic climate compared to a story about immigrants in general (Esses et al., 2001). Similarly, Whites show stronger zero-sum beliefs about race after reading about increasing bias against their own group, and show greater expectations of discrimination against themselves when reading about companies with a pro-diversity stance (Wilkins et al., 2015; Dover et al., 2016). This is also seen in gender relations, where men are more likely to hold zero-sum beliefs about gender when primed to think about how women have made gains in recent times (Kuchynka et al., 2018). Altogether, it is clear that while certain individual differences and social identities may predispose individuals towards seeing things as

zero-sum more broadly, context-dependent factors also play a key role in determining whether a particular situation is seen as zero-sum.

### **Symbolic Zero-Sum Thinking**

Given that zero-sum thinking can manifest as both a general mindset as well as a reaction to situational information, it seems possible that zero-sum beliefs might be broad enough to apply to the most abstract parts of our daily lives: symbolic resources. What exactly are symbolic resources? To help us define symbolic resources and how they can come to be seen as zero-sum, I will focus on one particular case study involving prejudice by white people against black people. One theoretical approach to prejudice is realistic group conflict theory, which emphasizes the perception by Whites that Blacks pose real and tangible threats to their lives. These threats and changes to the status quo are tangible, visible, unmistakable, and rooted in the realities of direct competition between Blacks and Whites for scarce resources (Levine & Campbell, 1972). For example, Whites may perceive that Blacks are moving into their quiet suburban neighborhoods, or that Blacks want better jobs and will displace White workers, or that Black children are taking resources from White children in integrated schools. In contrast to this overt prejudice, the other approach to prejudice conceptualizes it as a “hidden” form of racism, commonly known as symbolic racism. Symbolic racism has little to do with the direct impact of racial issues on the lives of Whites. Instead, symbolic racism, often a product of sociocultural learning, refers to the resistance to change in the racial status quo based on moral feelings that Blacks violate traditional American values and that Black progress encroaches upon the social influence held by Whites. This type of perceived threat is far more abstract, and is based more on feeling than tangible outcomes, but has been shown to characterize modern prejudice more accurately than the older realistic group conflict theory (Kinder & Sears, 1981). I use a similar

framework to describe resources, with material resources being resources where the quantities, distribution, and give and take of the resource are unmistakable (e.g., a pizza, a monetary budget, jobs at a company, seats in a classroom). On the other hand, symbolic resources refer to nontangible resources that do not have clear limits, distribution, or give and take. These resources instead are based on interpersonal relationships and social influence (e.g., respect, love, freedom, cultural values). Importantly, I do not mean to suggest that material vs. social resources are hard and fast categories, and is certainly not the only way to categorize resources. Rather, I present this framework as an intuitive way to explain distinctions between resources that I believe could be important for zero-sum thinking.

There is good reason to think that people may, at the very least, sometimes see symbolic resources as zero-sum. While the early conceptualizations of zero-sum games and zero-sum thinking were based on the notion of a fixed pie (Pinkley et al., 1995; Thompson & Hastie, 1990; Bazerman & Neale, 1983), research over the past 30 years has studied zero-sum beliefs far outside the context of a fixed pool of physical resources. For instance, zero-sum beliefs have been shown for abstract concepts such as wealth, social hierarchies, success, discrimination, and social rights issues (Sirola & Pitesa, 2017; Wilkins et al., 2015; Kuchynka et al., 2018; Wilkins et al., 2021; Andrews-Fearon & Davidai, 2022). Importantly, for many of the studies on what could be seen as bearing resemblance to symbolic resources (discrimination, social rights), zero-sum beliefs are always presented in the context of group competition (e.g., “*When women get rights they are taking rights away from men*”, “*less discrimination against women means more discrimination against men*”) (Wilkins et al., 2015).

Yet as interesting as these results are for the understanding of how people view social justice, these zero-sum beliefs may not be as reflective of how people view the give and take of



resources at the individual level. In other words, asking someone whether women's rights take away from men's rights is very different from asking someone whether one person's rights takes away from someone else's rights. The former is focused on understanding how people perceive the zero-sum relationship between men and women. The latter is focused on understanding how people perceive whether rights are zero-sum. We know that men, compared to women, are more likely to see the former as being more zero-sum. But our understanding of the latter, and if, when, and why people see the many other symbolic resources that define our day-to-day lives as being zero-sum, is not clear. On top of this, the extent to which we see symbolic resources as zero-sum may hold many unique implications for understanding cooperation, prosociality, and more generally social behavior. In my dissertation, one of the primary aims is to address this knowledge gap. Specifically, I examine how people think about symbolic resources and the extent to which these beliefs are malleable and can be shaped by context. By doing so, I hope to shed light on the relatively unexplored psychology of symbolic zero-sum beliefs and further the understanding of zero-sum thinking overall.

### *Cognitive Basis of Zero-Sum Thinking*

There are several theoretical explanations for when and why symbolic resources might be zero-sum. First, people may hold a general cognitive heuristic to see resources, particularly ones that are ambiguous, as being zero-sum. It has been argued that zero-sum thinking is a cognitive adaptation derived from a history of competition for limited resources. When early humans lived in hunter-gatherer societies where resources were scarce, people may have become particularly sensitive to the notion that "there is not enough for everyone", thereby leading to the inference that a gain by one person means losses for another. Tversky & Kahneman (1974) conceptualized heuristic judgments as being similar to subjective judgments of physical quantities, like distance

and size, in which the unknown properties of one object were judged based on the known properties of another object. In situations where the distribution of resources is ambiguous or uncertain, a zero-sum heuristic could serve as a tool to simplify inference, promote clear-cut decision making, and facilitate successful competition (Wright, 2000; Rubin, 2002; Pilditch et al., 2019). It has even been argued that this can manifest as a zero-sum bias where people perceive a non zero-sum situation to be zero-sum, an error driven by an overgeneralization from the many aspects of life that are zero-sum (Meegan, 2010). While it is often difficult to objectively measure whether something is or is not zero-sum, many experts agree that things such as negotiations, wealth, jobs, and success are generally not finite commodities. However, empirical evidence on subjective appraisals of these situations shows that people naturally assume them to be zero-sum because they perceive (usually erroneously) that resources are limited (Bazerman, 1983; Carnevale & Pruitt, 1992; Baron & Kemp, 2004; Walker, 2007; Esses et al., 2001; Sirola & Pitesa, 2017). Thus, even for symbolic resources where there is certainly not clear evidence of fixed limitation, it could still be that people overgeneralize a zero-sum heuristic onto them.

### *Motivational Basis of Zero-Sum Thinking*

Another potential driver of symbolic zero-sum beliefs is motivation. Zero-sum beliefs have been posed as both a mechanism for both justifying existing inequity (Esses et al., 2001; Wilkins, 2015) as well as motivating behavior that aims to create or preserve inequity (Andrews-Fearon & Davidai, 2022; Wilkins et al., 2022; Chernyak-Hai & Davidai, 2022). Research on zero-sum beliefs in high-status groups (Whites, men) support this theory. High status groups, but not low status groups, show greater zero-sum beliefs about gender or race after reading about gains for the low status group. This is thought to be due to the threat to status quo that is salient

for high status individuals. Furthermore, zero-sum beliefs are shown to correspond with efforts to improve the outcomes for oneself and one's group, and stifle progress and gains for others and outgroups (Wilkins et al., 2015; Kuchynka et al., 2018; Chernyak-Hai & Davidai, 2022; Sirola & Pitesa, 2017; Esses et al., 2001). A motivational explanation is also supported from other studies that show asymmetric zero-sum beliefs between groups, which demonstrate that ingroup consequences and losses are processed differently than outgroup outcomes and losses (Lowery et al., 2007; Powell et al., 2005; Roberts & Davidai, 2021). In a similar vein, research on political ideology and zero-sum beliefs has shown that both liberals and conservatives endorse zero-sum beliefs when issues are framed as preserving the status quo, or challenging the status quo, respectively. This study not only highlights how zero-sum thinking is a universal tendency, but it also suggests that people may be motivated to view life as zero-sum both to preserve the integrity of their own beliefs and to convince others about them (Davidai & Ongis, 2019). All in all, the motivational processes seen in previous research may also apply for symbolic zero-sum beliefs. Many symbolic resources, such as respect and love, are highly valued and seeing these resources as zero-sum may facilitate competitive behaviors that either preserve status quo or seek to change status quo in favor of oneself.

## **Current Research**

In three chapters and 9 studies, this dissertation investigates people's intuitions about symbolic resources and whether or not they see them as zero-sum. First, it is unknown if people even see symbolic resources as zero-sum. In Chapters 1 and 2, I address this by measuring default zero-sum beliefs for a variety of symbolic resources. I also measure zero-sum beliefs for material resources to provide an appropriate comparison set of items—if people do see symbolic resources as zero-sum, do they see them as more or less zero-sum than limited material

resources. Chapter 1 also allows me to explore the development of these zero-sum intuitions in early childhood. Second, it is not clear whether symbolic zero-sum beliefs are rigid, or whether they can be changed by contextual factors such as resource scarcity or competition. In Chapters 1, 2, and 3, I prime various potential drivers of symbolic zero-sum beliefs (renewability, competition, resource abundance) to see the extent to which I can move symbolic zero-sum beliefs. And finally, when symbolic resources begin to feel more zero-sum, what psychological mechanisms might explain this? In Chapters 2 and 3, I test motivational and cognitive explanations for symbolic zero-sum thinking.

## **Chapter 1: Does Your Love Take Away From Mine? The Role of Rivalry and Renewability on Symbolic Zero-Sum Thinking**

*Jez: There's only so much happiness in the world Mark, and they are hoarding it all.*

*Mark: That's not how happiness works \*thinks to himself... it completely is\* -The Peep Show*

From trees trying to outgrow each other to hunter-gatherers who competed for finite food and mates in small groups, competition for limited resources is ubiquitous on earth throughout history. It has been proposed that humans have evolved certain cognitive adaptations to facilitate successful competition (Wright, 2000; Rubin, 2002). Zero-sum thinking, the belief that one party's gains results in an equivalent loss for another (Von Neumann & Morgenstern, 1944), is one such tendency that may indeed motivate individuals to compete for resources. But zero-sum thinking also has adverse consequences, giving rise to intergroup prejudice and conflict (Burleigh et al., 2017; Esses, 2001; Ruthig et al., 2021; Wilkins et al., 2015), decreased prosocial behaviors (Jiang et al., 2020; Sirola & Pitesa, 2017; Chernyak-Hai & Davidai, 2022), and the overlook of mutually beneficial outcomes (Thompson, 1991; Thompson & Hrebec, 1996). )

Importantly, these zero-sum beliefs are often specific to certain individuals or groups, usually those who would be on the losing end from such a zero-sum relationship (Roberts & Davidai, 2021), which can increase hostility between groups that have this zero-sum thinking—if I think your progress means a loss for me, I will not be in favor of you making progress.

To mitigate the adverse effects of zero-sum thinking, it is important to understand its nature and origins. Existing research on zero-sum thinking has largely focused on either the moderating role of group identity on zero-sum beliefs (Norton & Sommers 2011; Kehn & Ruthig, 2013; Davidai & Ongis, 2019), or how situational cues of competition and scarcity foster

zero-sum beliefs (Ongis & Davidai, 2021; Wilkins et al., 2015; Wilkins et al., 2022). The emergence of these studies have shown the proclivity for people to view what are often abstract and complex social issues (success, discrimination, equality) as zero-sum, calling into question whether zero-sum thinking is driven by these social contexts and identity, or reflects a more fundamental belief that many social goods, what we will refer to as symbolic resources, are inherently zero-sum. Our paper aims to shed light on these issues by examining zero-sum thinking for symbolic resources (in comparison to material resources) among adults and children. Do children and adults see symbolic resources (like love, leadership, and popularity) as being zero-sum and what does this tell us about their broader zero-sum thinking?

It is well known that adults see resources as zero-sum when it comes to material resources, both in cases where this is true and in cases where it may not be true. There are certainly instances in life where resources are indeed limited and distributed in a zero-sum manner. For example, in the classic example of a fixed pie, a larger slice for one person means a smaller slice for another. Many material resources work precisely this way, to the extent that I am using my wife's computer, she obviously cannot use her computer and vice versa. However, not everything is as objectively zero-sum. In addition to these contexts where resources are obviously zero-sum, there is evidence that people even see material resources as zero-sum in cases where they need not be. As illustrated in "the lump of labor fallacy" (Walker, 2007), people often assume that an economy can only support a fixed amount of labor, leading to the common view that immigrants are taking jobs away from existing citizens, which is regarded by economists as fallacious because of the numerous factors that affect labor levels. For instance, an increased amount of workers can cause an economy to grow, thereby increasing the total amount of jobs for everyone. The lump of labor fallacy is one example of many where people perceive a

zero-sum relationship for things (e.g., economic outcomes, success, discrimination) that do not necessarily have to be zero-sum (Johnson, 2018; Esses et al., 2001; Norton & Sommers, 2011; Kehn & Ruthig, 2013; Wilkins et al., 2022). Taken together these data suggest that people have a fairly pervasive tendency to see many resources as zero-sum. What does this mean for people's tendency to apply zero-sum thinking to symbolic resources like love, trust, and leadership?

Given existing findings on people's tendencies to perceive complex social issues as zero-sum (e.g., discrimination, romantic relationships), one very real possibility is that people will perceive all symbolic resources to be like physical resources, that is as zero sum. It has been suggested that people hold a general tendency to see exchanges of material goods (buying a car), as well as exchanges of more abstract resources (wealth) as zero-sum (Johnson et al., 2022; Meegan, 2010). It is possible that this generalization be applied even towards symbolic resources that need not be zero-sum. While we are certainly not here to make any normative judgments as to whether any of these things are actually zero-sum, this growing body of evidence highlights the possibility that people may also have basic intuitions that symbolic resources, such as love, trust, or leadership are zero-sum.

Alternatively, unlike material resources, people may perceive symbolic resources as more easily renewable than many material sources, which should lead them to see symbolic resources as completely non-zero-sum. Whereas physical resources are in some sense always zero-sum (you having my ball means I do not have it), this need not be true with many symbolic resources. Indeed, many of the examples of symbolic zero-sum thinking in the literature appear to be driven by the perception of antagonistic relationships between parties rather than people perceiving symbolic resources as inherently zero-sum (Wilkins et al., 2015; Kehn & Ruthig, 2013; Norton & Sommers, 2011; Wilkins et al., 2022). Many symbolic resources such as happiness and love

appear to be fairly renewable—the fact that I am happy for my partner’s success at work does not prevent me from being happy for my brother’s wedding announcement. Therefore, in the absence of groups competing for symbolic resources, it is possible that people will view symbolic resources as completely non-zero-sum.

A final possibility, and the one we prefer, is that people may perceive some symbolic resources as zero-sum and others as non-zero-sum. In economic theory, one of the fundamental dimensions along which goods are categorized is by their degree of rivalry. A good is rivalrous if its consumption by one consumer prevents simultaneous consumption by other consumers (Apestegua & Maier-Rigaud, 2006). Because of this, rival goods (e.g., an apple) are often zero-sum while non rival goods (e.g., broadcast television) are non zero-sum. A similar difference may apply to symbolic resources, where some symbolic resources may more likely depend on relative social rankings (e.g., popularity and leadership) and thus are more rival than others (e.g., love and trust). By examining the basic zero-sum intuitions that people have for different types of abstract symbolic resources, we hope to provide clarity on this open question and contribute to a more comprehensive understanding of what everyday situations people see as zero-sum. Thus, we have a fairly nuanced prediction: adults will see some symbolic resources as zero-sum (i.e., rival ones) while viewing other symbolic resources as non-zero sum (i.e., non-rival ones). We next discuss our prediction for how these concerns will emerge in childhood.

For as much attention as zero-sum thinking has received, relatively little is known about how zero-sum beliefs, particularly for abstract concepts (e.g., success, love, discrimination), come to be. Would young children, like adults, see some symbolic resources as zero-sum and also differentiate between rival and non-rival resources? While no research has directly answered this question it seems like there are two very real possibilities.



One possibility is that young children will not view resources as zero-sum because they do not have the requisite experiences with scarcity to recognize that resources as zero-sum. One of the proximate causes of zero-sum thinking is experiences that individuals have with scarce resources or zero-sum interactions in their developmental environment (Foster, 1965). And indeed, we see evidence for this empirically, with individuals in lower-GDP countries showing stronger zero-sum beliefs (Różycka-Tran et al., 2015). However, although there seems to be a link between zero-sum experiences and zero-sum thinking, the trajectory by which this relationship forms is still unclear. One possibility is that a zero-sum bias comes from a complex understanding of symbolic resources that people gain through having complicated experiences involving social competition and resource exchange. Given that children in many societies are shielded from many harsh realities by their parents (particularly those coming from an American sample), it may be that they don't experience directly dealing with true resource scarcity and competition until they are forced to "fend for themselves". Therefore, one might expect zero-sum biases to emerge later on in life, post childhood.

An alternative possibility is that children do indeed have zero-sum beliefs early in development and therefore may see symbolic resources as zero-sum. There is some support in the literature that young children track resource scarcity and competition in a way that suggests that they may see resources as zero-sum. Young children, aged 4- to 5-years-old, have been shown to be sensitive to resource scarcity and heavily consider it when making resource allocation decisions (Huppert et al., 2020; Echelbarger & Gelman, 2017; Ahl & Dunham, 2019). It is also clear that children seek out relative advantage when it comes to resource competition (Sheskin et al., 2014). Children are less prosocial in competitive situations (Pappert et al., 2017; Toppe et al., 2019) and will prefer unfair distributors that favor them when they are placed into a

competitive mindset (Shaw et al., 2012). Given that young children show an understanding and consideration of resource scarcity and competition, it seems quite possible that children will hold similar zero-sum intuitions for at least some types of resources, and maybe even show similar zero-sum thinking as adults. Finding early evidence of zero-sum beliefs in children, and furthermore a similarity to adult zero-sum beliefs, would indicate that one does not need complex long-term interactions with scarce resources (e.g. in places like school or the workplace) in order to form these zero-sum beliefs, which will help constrain future hypotheses about the kinds of experiences that are necessary to form these beliefs.

In the current studies, we attempt to understand the nature and development of zero-sum beliefs for symbolic resources by addressing several key questions: 1) Are symbolic resources seen as zero-sum, and how do these beliefs compare to those for material resources? 2) Are rival symbolic resources seen as more zero-sum than nonrival symbolic resources? 3) Is (non) zero-sum thinking about symbolic resources rooted in childhood?

## **Study 1.1**

To answer these questions, in Study 1.1 we sought to understand how adults and children perceive symbolic resources that vary based on rivalry. Using a survey, we presented participants with resources that vary by nature (symbolic and material) and rivalry (rival and nonrival) in the context of a multi-party resource exchange. We measured zero-sum beliefs by asking participants to judge whether one party's gain of a resource resulted in another party's loss of the same resource. If participants reported the latter party had less as a result of the former's gain, this would indicate a zero-sum belief for said resource. We expected that symbolic resources

overall would be seen as less zero-sum than material resources, but that rival resources would also be seen as more zero-sum than nonrival resources.

## **Method**

*Participants.* We preregistered to recruit 60 adults and 60 children between the ages of 4 and 9, and data collection stopped when this goal was met. The final sample of children included 60 participants (Mean age = 7.33 years,  $SD = 1.62$  years, range = 4.03-9.88 years, 30 female, 30 male). The majority of children were recruited from a database in a mid-Western University and were from diverse socioeconomic backgrounds. Among these children, there were 40 White, 9 Black, 4 Asian or Pacific Islander, 0 Latino or Hispanic, 3 American Indian or Alaskan Native, and 4 Mixed or Other. Eleven additional children were tested but excluded due to distractions in the environment or incomplete responses. Parental consent and child assent were obtained before the testing.

We also recruited 60 adult participants on Amazon Mechanical Turk (MTurk) using TurkPrime (Age: mean = 41.77 years,  $SD = 14.20$ , range = 20-73 years, 18 female, 41 male, 1 other). Among the sample there were 43 White, 9 Black, 5 Asian or Pacific Islander, 3 Latino or Hispanic, 0 American Indian or Alaskan Native, and 0 Mixed or Other participants. All participants completed the survey in exchange for a small participation fee, were located in the US, and had a higher than 97% approval rate with above 100 completed tasks on the platform. Participants were told at the beginning of the study that they would be reading some stories and responding with their thoughts. We included an attention check in the adult survey, where participants were presented with a nonexperimental block of stimuli and instructed to choose a particular answer that was inconsistent with the information provided. The survey terminated automatically for participants who failed the attention check.

*Design and Procedure.* Each child was tested individually in a quiet space at home over Zoom (during the COVID-19 pandemic). Before the testing session began, we asked parents to check that their technical devices were functional, minimize background noise, and remove other distractions. Parents were allowed to remain in the same room as the child but were instructed not to talk to the child or comment on the study during testing. The testing session lasted an average of 10 minutes for each participant. All testing materials were presented through Qualtrics.

At the beginning of the session, children were told that “*In this game, I’m going to tell you about different things a child (point) has, such as stickers, music and love. Something will happen in the stories and I’ll ask you whether that changes the amount of things the child has.*” After this introduction, participants read and responded to four blocks of stories, each involving a different type of resource. In each block, participants were presented with two stories: *material-rival* (stickers and candies), *material-nonrival* (air and music), *symbolic-rival* (leadership and popularity), and *symbolic-nonrival* (love and trust). The four blocks were randomly presented, with the two resources in each block being randomized as well. To facilitate children’s understanding of the stories, participants were shown cartoon images of each character and the resource for each story.

In each story, participants were first introduced to Character A, who receives the resource from Character B. Then, the key event of the story is the introduction of Character C, who also gets the same resource from Character B. For example, for material resources (e.g., stickers), participants were told: “*This is Dex. Dex is using a page of stickers from this girl to make an art project.*” “*The child in the yellow shirt comes to their classroom and also uses stickers from the same page.*”). For symbolic resources (e.g., love), participants were told: “*This is Anne. Anne has*

*love from her mom, which means her mom really cares about her. The child in the green shirt is adopted by Anne's family and also has her mom's love*". Upon hearing this information, participants were asked if they thought Character A has less of the resource (e.g., sticker or love) than before, or the same amount of resource as before. See supplemental materials for all scenarios. A response of "the same amount" would indicate a perception of the resource as not being zero-sum (coded as 0), that Character C's gains does not lead to a loss for Character A. A response of "less amount" (coded as 1) would indicate that they view the resource as being zero-sum, that Character C's gains lead to a loss for Character A.

The adult participants completed the same survey but did so on their own and also completed a brief demographics questionnaire at the very end.

## **Results**

*Adults' Responses.* To examine how zero-sum beliefs for symbolic resources compare to material ones, and how rivalry influences these perceptions, as preregistered we conducted a generalized linear mixed effects model using resource type (symbolic vs material), resource nature (rival vs nonrival), and their interaction to predict adult participants' responses (0 = non zero-sum, 1 = zero-sum) with response ID included as a random effect. Overall, we found a main effect of resource type showing that adult's zero-sum beliefs for symbolic resources ( $M = 0.32$ ) were lower than their zero-sum beliefs for material ones ( $M = 0.51$ ) ( $B = -.78$ ,  $SE = 0.19$ ,  $z = -4.14$ ,  $p < 0.001$ , 95%  $CI [-1.16, -0.41]$ ), supporting the idea that symbolic resources were seen as less zero-sum than material goods. We also found that adults reported rival resources ( $M = 0.75$ ) as being more zero-sum than nonrival resources ( $M = 0.08$ ) ( $B = 3.47$ ,  $SE = 0.28$ ,  $z = 12.56$ ,  $p < 0.001$ , 95%  $CI [2.95, -4.04]$ ). Additionally, we found a two-way interaction between resource type and resource nature (likelihood ratio test comparing the full model to a model without the

interaction):  $\chi^2(1, N = 60) = 17.07, p < .001$ . To understand this interaction, we tested for simple effects of resource type (symbolic vs. material) within both nonrival and rival resources. We found that for *nonrival* resources, participants viewed nonrival symbolic resources (love and trust) as similarly non zero-sum as nonrival material ones (air and music),  $B = 0.00, SE = 0.00, z = 0.00, p = 1.0, 95\% CI [-1.02, 1.02]$ . When comparing responses to chance, binomial tests showed that the majority of adults viewed both nonrival symbolic resources ( $M = 0.08, p < 0.001$ ) and nonrival material resources ( $M = 0.08, p < 0.001$ ) as non-zero sum. We found that for *rival* resources, adults also viewed rival symbolic resources ( $M = 0.56$ ) as less zero-sum than rival material ones ( $M = 0.93$ ) ( $B = -2.97, SE = 0.53, z = -5.59, p < 0.001, 95\% CI [-4.13, -2.02]$ ). Binomial tests indicated that the majority of people viewed rival material resources as zero-sum ( $M = 0.93, p < 0.001$ ), whereas only half of people viewed rival symbolic resources as zero-sum ( $M = 0.56, p = 0.24$ ).

*Children's Responses.* We took a similar approach to analyzing the data from the child sample, except that we also added age as a moderator to explore whether there were any developmental changes in children's perceptions of symbolic resources. To do this, as preregistered, we conducted a generalized linear mixed effects model using resource type (symbolic vs material), resource nature (competitive vs noncompetitive), age (in years), and their interactions to predict child participants' responses (0 = non zero-sum, 1 = zero-sum), with response ID included as a random effect. We found a significant 3-way interaction between resource type, resource nature, and age (likelihood ratio test comparing the full model to a model without the interaction:  $\chi^2(1, N = 60) = 9.45, p = 0.002$ ). To unpack this interaction, we examined the data by median split of age (7.33 years) and used the same analysis approach as we did for the adult data for each group of children.

For the older children sample, we again conducted a generalized linear mixed effects model using resource type (symbolic vs material), resource nature (rival vs nonrival), and their interaction to predict responses (0 = non zero-sum, 1 = zero-sum), with response ID included as a random effect. Overall, similar to adults, we found a main effect of resource type showing that older children viewed symbolic resources ( $M = 0.34$ ) as being less zero-sum than material ones ( $M = 0.54$ ) ( $B = -0.82$ ,  $SE = 0.27$ ,  $z = -3.08$ ,  $p < 0.002$ , 95%  $CI [-0.31, -1.36]$ ). Older children also reported that rival resources ( $M = 0.73$ ) were more zero-sum than nonrival ones ( $M = 0.16$ ) ( $B = 2.88$ ,  $SE = 0.38$ ,  $z = 7.56$ ,  $p < 0.001$ , 95%  $CI [2.18, 3.68]$ ). Similar to adults, we also found a two-way interaction between resource type and resource nature (likelihood ratio test comparing the full model to a model without the interaction:  $\chi^2(1, N = 60) = 22.40$ ,  $p < .001$ ). We found that for *nonrival* resources, older children viewed nonrival symbolic resources (love and respect) ( $M = 0.18$ ) as similarly non zero-sum as nonrival material ones (air and music) ( $M = 0.13$ ) ( $B = 0.44$ ,  $SE = 0.54$ ,  $z = 0.801$ ,  $p = 0.42$ , 95%  $CI [-.62, 1.55]$ ). Binomial tests indicated that the majority of older children viewed both nonrival symbolic resources ( $M = 0.18$ ,  $p < 0.001$ ) and nonrival material resources ( $M = 0.13$ ,  $p < 0.001$ ) as non-zero sum. We found that for *rival* resources, older children viewed rival symbolic resources ( $M = 0.50$ ) as less zero-sum than rival material ones ( $M = 0.95$ ) ( $B = -4.19$ ,  $SE = 1.02$ ,  $z = -4.11$ ,  $p < 0.001$ , 95%  $CI [-6.59, -2.49]$ ). Binomial tests indicated that the majority of older children viewed rival material resources as zero-sum ( $M = 0.95$ ,  $p < 0.001$ ), whereas only half of older children viewed rival symbolic resources as zero-sum ( $M = 0.50$ ,  $p = 1.00$ ).

We conducted a similar linear mixed effects model with younger children. Similar to adults and older children, younger children reported symbolic resources ( $M = 0.32$ ) as being less zero-sum than material resources ( $M = 0.48$ ) ( $B = -0.93$ ,  $SE = 0.31$ ,  $z = -2.99$ ,  $p = 0.003$ , 95%  $CI$

[-1.51, -0.31]), and rival resources ( $M = 0.55$ ) as more zero-sum than nonrival resources ( $M = 0.25$ ) ( $B = 1.82, SE = 0.36, z = 5.06, p < 0.001, 95\% CI [1.12, 2.53]$ ). The two-way interaction between resource type and nature did not reach significance for younger children ( $\chi^2(1, N = 60) = 2.50, p = 0.11$ ). To understand how young children viewed each type of resource, we also examined the simple effects of resource type (symbolic vs. material) within both nonrival and nonrival resources, as well as compared their responses to chance. We found that similar to older children and adults, younger children saw nonrival symbolic resources (love and respect) ( $M = 0.22, p < 0.001$ ) as similarly non zero-sum as nonrival material ones (air and music) ( $M = 0.28, p = 0.001$ ) ( $B = -0.52, SE = 0.51, z = -1.00, p = 0.32, 95\% CI [-.62, 1.55]$ ). Younger children also viewed rival symbolic resources ( $M = 0.42, p = 0.25$ ) as less zero-sum than rival material ones ( $M = 0.68, p = 0.006$ ) ( $B = -1.88, SE = 0.57, z = -3.29, p < 0.001, 95\% CI [-3.11, -0.84]$ ).

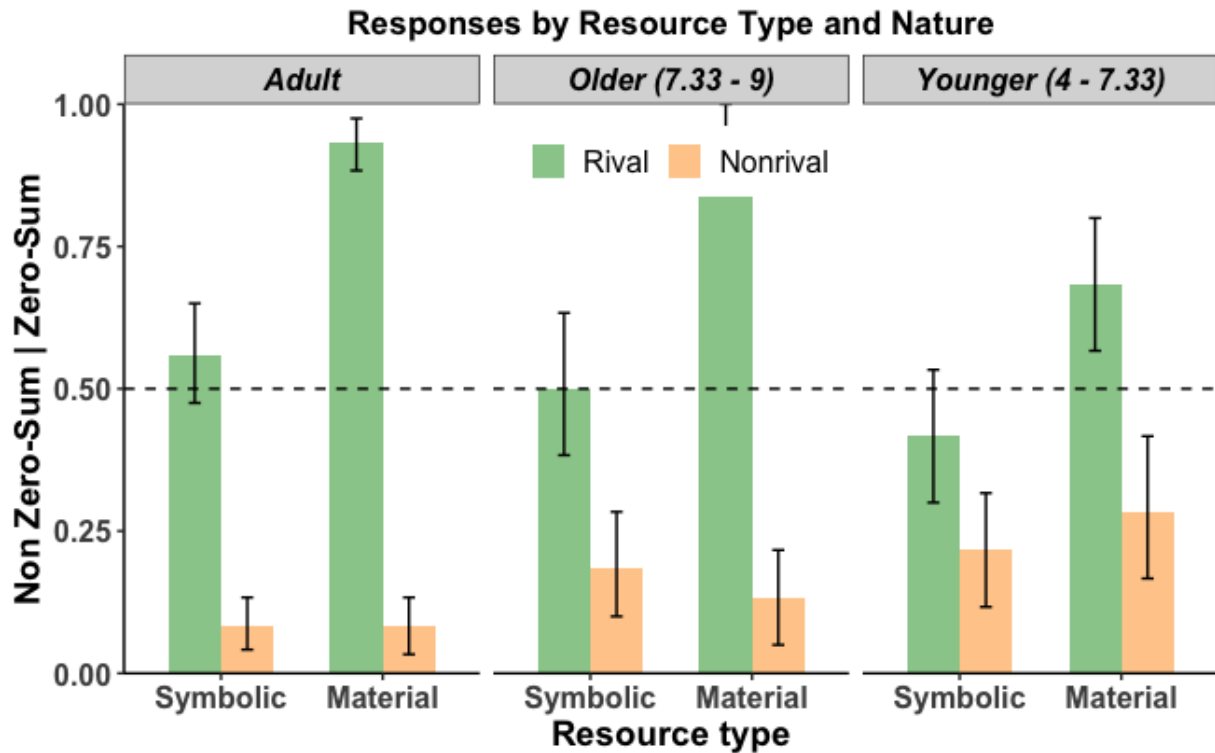


Figure 1. Zero-sum ratings of material and symbolic resources.



## Discussion

After presenting adults and children with various resource distribution vignettes, we found that both children and adults generally saw (at least some) material and symbolic resources as being non zero-sum, in particular material and symbolic goods that were thought to be “rival goods”. As expected, children recognized that rival material resources like stickers were zero-sum—believing that if one child has a sticker, it meant that the other child has less of that sticker. Interestingly and aligned with our predictions, about half of adults and children also viewed rival symbolic resources, popularity and leadership, as being zero-sum—believing that if one child became more popular the other child would become less popular. These results indicate that both children and adults can see both material and symbolic resources as being zero-sum. Despite potentially seeing both material and symbolic resources as zero-sum, both children and adults clearly regarded rival material resources as being more zero-sum than symbolic resources.

Importantly for our hypothesis, children and adults also were capable of seeing some symbolic (and material resources) as non-zero-sum, indicating that they do not see all resources as zero-sum. For nonrival symbolic resources, love and trust, participants viewed them similarly to how they viewed unlimited material resources like air and music. This suggests that people may see love and trust as unlimited resources that have no limit, where one’s gain does not lead to losses for another.

Indeed, across the sample we saw that children and adults differentiate between rival and non-rival resources and that this differentiating became stronger as children matured. The decreased zero-sumness of nonrival symbolic resources shows that symbolic resources are not all seen the same, and that variations in the rivalry of symbolic resources shape zero-sum beliefs,

perhaps similarly to the psychological mechanisms behind material zero-sum thinking—indeed we saw the same pattern for rival and non-rival material resources.

## Study 1.2

Study 1 found that symbolic resources, both nonrival ones (e.g., love and trust) and rival ones (e.g., leadership and popularity), were viewed as less zero-sum than rival material resources (e.g., stickers and candies). The primary goal of Study 2 is to explore the cognitive mechanism underlying why people perceive symbolic resources as less zero-sum than rival material resources like stickers. One interpretation could be that people see symbolic and material resources as distinct categories, such that symbolic resources are perceived as inherently less zero-sum than their material counterparts. This explanation posits that the qualitative distinction between the symbolic and material nature of a resource can explain how zero-sum it is judged to be (i.e., the *inherent property* hypothesis). However, the discrepancy between symbolic and material resources may also be rooted in the fundamental difference in terms of how they are created and their natural renewability (i.e., the *renewability* hypothesis). Rival material resources like stickers and candy are produced from tangible physical materials and require time, labor, and energy. Therefore, without the means to produce more stickers (i.e., a sticker printer), an individual giving out stickers has no means of renewing the resource at will and thus one person's gain can be another person's loss in the given context. In contrast, symbolic resources are both distributed and created by people, and usually do not incur the previously described barriers to creation. For example, with the intention and will to give more respect and love, an individual is able to do so and renew those symbolic resources at will. Therefore, unlike the *inherent property* hypothesis that predicts symbolic resources will be viewed as inherently less

zero-sum than material resources, the *renewability* hypothesis predicts that both material and symbolic resources can be viewed as more or less zero-sum, depending on their renewability.

Study 2 aims to test these competing hypotheses by directly manipulating the renewability of major resources in Study 1 (i.e., stickers, love, and leadership), presenting the resources either as renewable (*renewable* condition) or nonrenewable (*nonrenewable* condition). A secondary goal of Study 2 is to conceptually replicate the major findings in Study 1 (i.e., the *default* condition, with no renewability information), using similar testing materials as in Study 1 except simple modifications (e.g., gave participants three instead of two answer options “less, same, more”, added an inference question about whether the giver was able to create more of the resources). Each participant was randomly assigned to either the *renewable* condition, the *nonrenewable* condition, or the *default* condition, and responded to three representative types of resources in each condition (stickers, love, leadership).

## **Method**

*Participants.* We preregistered to recruit at least 180 children between the ages of 5 and 9 (at least 60 per condition), and data collection stopped when this goal was met. The final sample included 220 children who signed up and completed our study (Age: mean = 7.60 years,  $SD = 1.47$ , range = 4.92-9.94 years, Gender: 121 female, 99 male, Ethnicity: 100 White, 20 Black or African American, 38 Asian or Pacific Islander, 33 Latino or Hispanic, 3 American Indian or Alaskan Native, 26 Mixed or Other). The majority of the children were recruited from a database in a mid-Western University and were from diverse socioeconomic backgrounds. Five additional children were tested but excluded due to experimental error and distractions in the environment. Parental consent and child assent were obtained before the testing.

We also recruited 182 adult participants on Amazon Mechanical Turk (Mturk) using TurkPrime (Age: mean = 41 years,  $SD = 12.32$ , range = 23-78 years, Gender: 95 female, 84 male, 3 Other, Ethnicity: 142 White, 13 Black or African American, 16 Asian or Pacific Islander, 4 Latino or Hispanic, 1 American Indian or Alaskan Native, 6 Mixed or Other). All participants were located in the US and had a higher than 97% approval rate with above 100 completed tasks on the platform. Participants were told at the beginning of the study that they would be completing a survey in which they would make judgments about how resources are divided between individuals.

*Design and Procedure.* We followed the same online testing procedure as in Study 1. Participants were randomly assigned to one of three conditions (between-subjects): *default*, *renewable*, or *nonrenewable*. In each condition, participants saw three vignettes each with a different type of resource (within-subjects): *stickers* (material), *love* (noncompetitive symbolic), *leadership* (competitive symbolic). In the default condition, participants read the exact same vignettes from Study 1. In the *renewable* condition, participants were told that the giver has a way to make more of the resource (i.e., *the girl has a sticker machine to make more stickers; the mom has a big heart to make more love; the class has many activities so the teacher can create more power to lead*). In the *nonrenewable* condition, participants were told that the giver does not have a way to make more of the resource (i.e., *the girl does not have a sticker machine and is unable to make more stickers; loving someone takes a lot of energy so the mom is not able to create more love; the class has few activities so the teacher cannot create more power to lead*). Following this manipulation of renewability, participants were presented a *renewability* question to assess their understanding of the resource's renewability: "If another child also needs stickers right now, do you think the girl IS ABLE to create more stickers to make the roll longer

all by herself, or NOT ABLE to create more stickers?”. Participants responded using a binary choice of “Is able to” (coded as 1) or “Not able to” (coded 0). This check question was also given to participants in the default condition to measure their default perception of renewability as well, with no feedback given. See supplemental materials for full descriptions of scenarios and questions.

One minor change from Study 1 was that along with the “same amount” and “less amount” answer choices, we also included a third option of “more amount”. We included this option because if a resource is made renewable, it is possible that people may view the first recipient as being able to actually get more than they had before. We decided beforehand that if a significant number of participants chose this option, we would infer that this line of thinking was conceptually different from choosing the “same amount” response. However, if very few participants chose this, we would code it together with the “same amount” responses as “non zero-sum responses” for the analyses. After the zero-sum question, participants were asked to explain in a short answer their choice for the previous zero-sum question. Adult participants responded to the same survey through Qualtrics. We included a standalone attention check in the survey that resulted in a survey termination if it was incorrectly answered, and adult participants completed a brief questionnaire at the end of the survey.

## **Results**

Across all the 546 responses, only 3.1% were “more” responses. Therefore, we analyzed the data by coding the “more” and “same” responses as non zero-sum responses (coded as 0), and “fewer” responses as zero-sum responses (coded 1). We also conducted the same following analyses with “more” coded as -1 and “same” coded as 0 and found similar results.

*Adult default perceptions.* To get a sense of adults' default zero-sum perceptions of the resources, we conducted a generalized linear mixed effects model, using resource type (stickers, love, leadership) to predict their zero-sum responses, with participant ID included as a random effect. We found that resource type significantly improved model fit,  $\chi^2(2, N = 61) = 93.3, p < .001$ . Adults viewed stickers as more zero-sum ( $M = 0.89, p < 0.001$ ) than leadership ( $M = 0.66, p = 0.02$ ) ( $B = 2.01, SE = 0.69, z = 2.93, p = 0.003, 95\% CI [0.67, 3.35]$ ) and love ( $M = 0.11, p < 0.001$ ) ( $B = 6.10, SE = 1.36, z = 4.48, p < 0.001, 95\% CI [3.43, 8.77]$ ), and viewed leadership as more zero-sum than love ( $B = 4.09, SE = 1.00, z = 4.09, p < 0.001, 95\% CI [2.13, 6.06]$ ), which conceptually replicated the patterns in Study 1 that adults viewed symbolic resources like love and leadership as less zero-sum than rival material resources, Figure 2.

To explore the role of default perceptions of renewability in people's zero-sum thinking, we used participants' beliefs about renewability (1= able to renew, 0 = not able to renew) to predict their zero-sum responses (1= zero-sum, 0 = not zero-sum) in a generalized linear model, with participant ID and resource type included as random effects. We found a significant effect of perceived renewability, with participants who responded that the resource was renewable ( $M = 0.89$ ) showing lower zero-sum beliefs than those who responded that the resource was not renewable ( $M = 0.21$ ) ( $B = -3.62, SE = 0.77, z = -4.71, p < 0.001, 95\% CI [-5.12, -2.11]$ ), providing initial support to the possibility that renewability may influence zero-sum thinking.

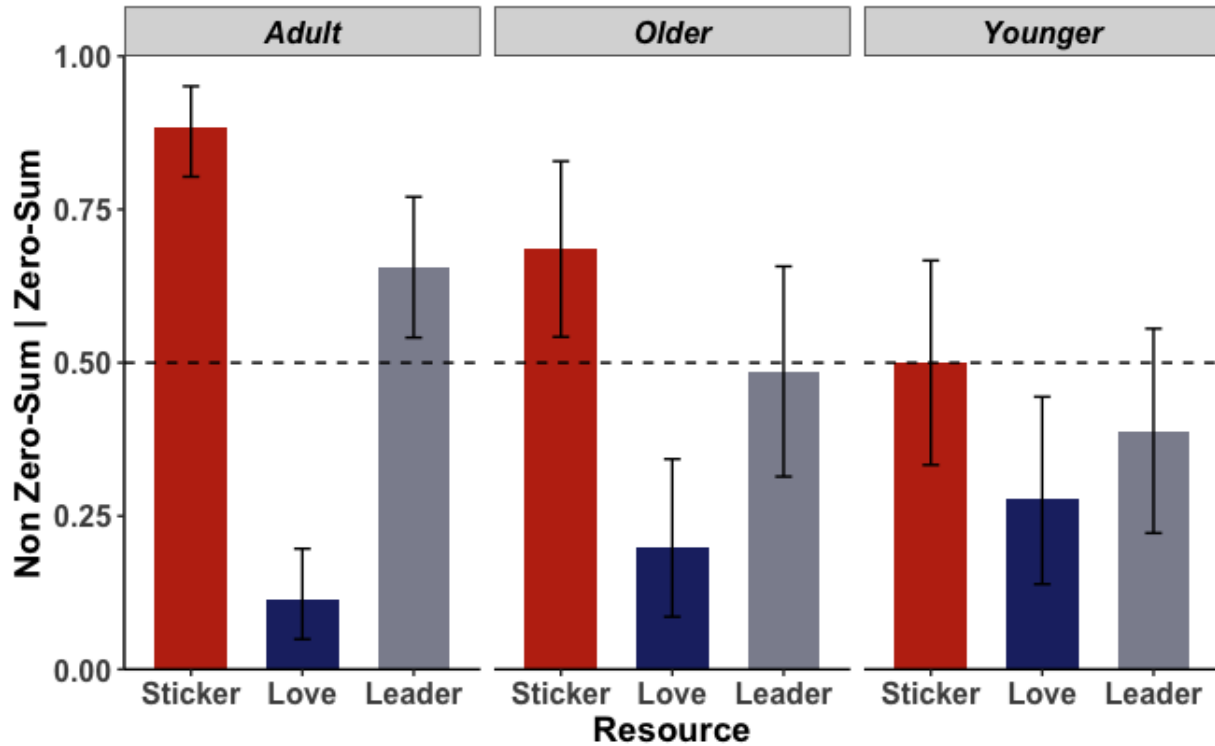


Figure 2. Default zero-sum ratings of resources.

*Adult Renewability effect.* To examine our key research question, whether renewability affects people's zero-sum thinking about symbolic and material resources, we conducted a generalized linear mixed effects model, using condition (renewable, nonrenewable), resource type (stickers, love, leadership), and their interaction to predict participants' responses, with response ID included as random effects. We found a main effect of renewability, with resources in the renewable condition ( $M = 0.18$ ) being seen as less zero-sum than both those in the nonrenewable ( $M = 0.66$ ) ( $B = -2.27$ ,  $SE = 0.29$ ,  $z = -7.76$ ,  $p < 0.001$ , 95%  $CI [-2.91, -1.74]$ ), suggesting renewability makes a difference in people's zero-sum beliefs. We also found a main effect of resource,  $\chi^2(2, N = 121) = 24.1$ ,  $p < .001$ , with both love ( $M = 0.27$ ) being seen as less zero-sum than both stickers ( $M = 0.52$ ) ( $B = -1.51$ ,  $SE = 0.35$ ,  $z = -4.34$ ,  $p < 0.001$ , 95%  $CI [-2.20, -0.83]$ ) and leadership ( $M = 0.47$ ) ( $B = -1.22$ ,  $SE = 0.34$ ,  $z = -3.60$ ,  $p < 0.001$ , 95%  $CI [-$

1.89, -0.56]) and there was no significant difference in the way participants viewed stickers and leadership ( $B = 0.29$ ,  $SE = 0.31$ ,  $z = 0.93$ ,  $p = 0.35$ , 95%  $CI [-0.32, 0.90]$ ).

We also found a significant interaction between condition and resource type,  $\chi^2(2, N = 121) = 11.81$ ,  $p < .001$ . To understand this interaction, we conducted generalized linear models to analyze the effect of condition for each resource separately. Consistent with our overall *renewability hypothesis*, we found a significant difference between renewable and nonrenewable conditions for all three resources (although the difference was bigger for some resources than others). Specifically, for stickers, people's responses were less zero-sum for the renewable condition ( $M = 0.22$ ,  $p < 0.001$ ) compared to the nonrenewable condition ( $M = 0.82$ ,  $p < 0.001$ ) ( $B = -2.80$ ,  $SE = 0.46$ ,  $z = -6.12$ ,  $p < 0.001$ , 95%  $CI [-3.74, -1.94]$ ). We found that for love, people's responses were also less zero-sum for the renewable condition ( $M = 0.02$ ,  $p < 0.001$ ) compared to the nonrenewable condition ( $M = 0.52$ ,  $p < 0.001$ ) ( $B = -4.18$ ,  $SE = 1.04$ ,  $z = -4.01$ ,  $p < 0.001$ , 95%  $CI [-7.08, -2.56]$ ). We also found similar results for leadership, where participants in the renewable condition ( $M = 0.30$ ,  $p = 0.003$ ) felt leadership was less zero-sum than those in the nonrenewable condition ( $M = 0.64$ ,  $p = 0.04$ ) ( $B = -1.42$ ,  $SE = 0.39$ ,  $z = -3.66$ ,  $p < 0.001$ , 95%  $CI [-2.20, -0.67]$ ). These data can be seen in Figure 3.



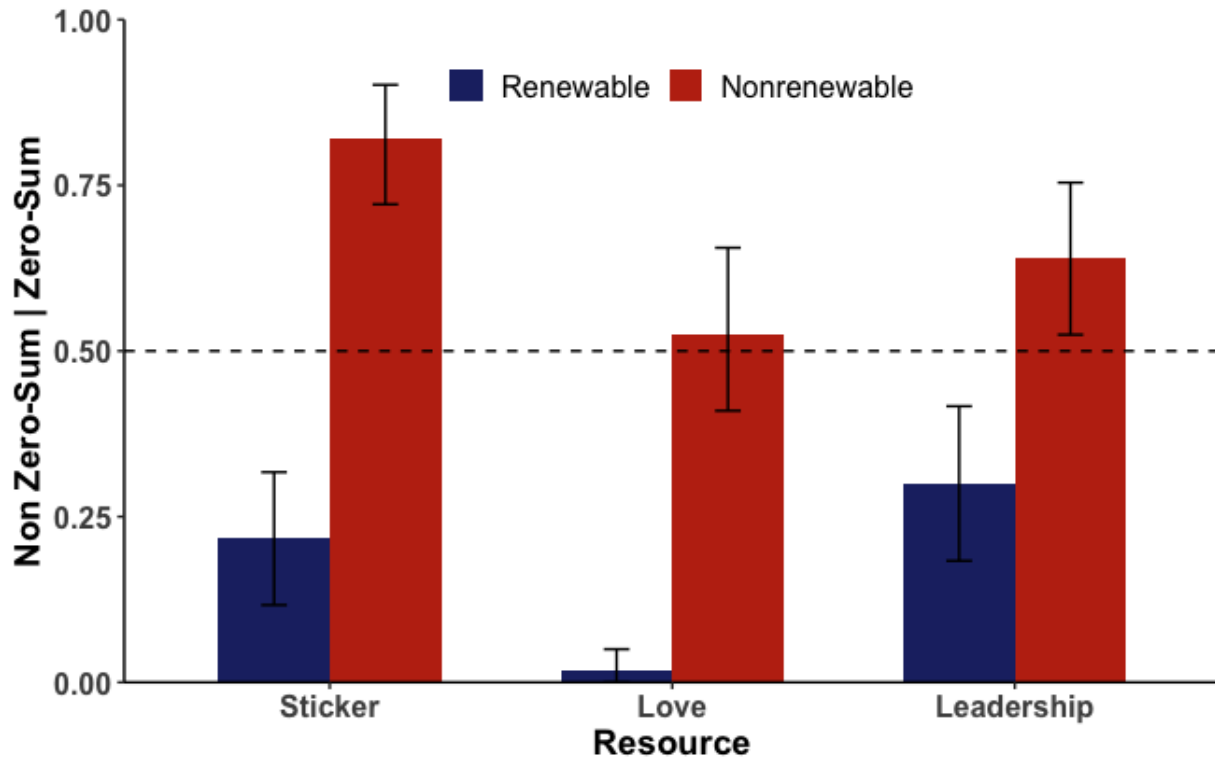


Figure 3. Adult zero-sum ratings of renewable and nonrenewable resources. Adults saw renewable versions of resources as less zero-sum than nonrenewable versions.

*Child default perceptions.* To get a sense of children’s default zero-sum perceptions of the resources and potential developmental changes, we conducted a generalized linear mixed effects model, using resource type (stickers, love, leadership), age, and their interaction to predict children’s perceptions, with participant ID included as a random effect. We found a main effect of resource type,  $\chi^2(2, N = 71) = 26.01, p < .001$ . Children viewed stickers as more zero-sum ( $M = 0.59, p = 0.15$ ) than leadership ( $M = 43, p = 0.34$ ) ( $B = 0.96, SE = 0.44, z = 2.20, p = 0.03, 95\% CI [0.11, 1.81]$ ) and love ( $M = 0.24, p < 0.001$ ) ( $B = 1.34, SE = 0.47, z = 2.83, p < 0.001, 95\% CI [1.27, 3.32]$ ), and viewed leadership as more zero-sum than love ( $B = 1.34, SE = 0.47, z = 2.83, p = 0.005, 95\% CI [0.41, 2.26]$ ). We did not find a main effect of age,  $\chi^2(2, N = 71) = 0.84, p = 0.36$ , and the interaction between age and resource type did not reach significance,  $\chi^2(2, N = 71) = 5.00, p = .08$ . The results replicated the basic patterns in Study 1 that children

and adults viewed symbolic resources like love and leadership as less zero-sum than rival material resources.

To explore the role of default perceptions of renewability in children's zero-sum thinking, we used participants' beliefs about renewability (1= able to renew, 0 = not able to renew) to predict their zero-sum responses (1= zero-sum, 0 = not zero-sum) in a generalized linear model, with participant ID and resource type included as random effects. We found a significant effect of perceived renewability, with participants who responded that the resource was renewable ( $M = 0.59$ ) showing lower zero-sum beliefs than those who responded that the resource was not renewable ( $M = 0.26$ ) ( $B = -1.48$ ,  $SE = 0.43$ ,  $z = -3.45$ ,  $p < 0.001$ , 95%  $CI [-2.31, -0.64]$ ). Including age in the model did not reveal a significant interaction between age and renewability beliefs,  $\chi^2(1, N = 71) = 0.76$ ,  $p = 0.38$ .

*Child Renewability effect.* To examine the effect of renewability and potential developmental changes, we conducted a generalized linear mixed effects model, using condition (renewable, nonrenewable), resource type (stickers, love, leadership), age, and their interactions to predict participants' responses, with response ID included as random effects. We found a main effect of renewability, with resources in the renewable condition ( $M = 0.40$ ) being seen as less zero-sum than those in the nonrenewable condition ( $M = 0.63$ ) ( $B = -1.14$ ,  $SE = 0.27$ ,  $z = 4.13$ ,  $p < 0.001$ , 95%  $CI [-1.72, -0.61]$ ), suggesting renewability makes a difference in children's zero-sum beliefs. We also found a main effect of resource,  $\chi^2(2, N = 149) = 26.73$ ,  $p < .001$ , with love ( $M = 0.38$ ) being seen as less zero-sum than both stickers ( $M = 0.62$ ) ( $B = -1.39$ ,  $SE = 0.30$ ,  $z = -4.67$ ,  $p < 0.001$ , 95%  $CI [-1.97, -0.81]$ ) and leadership ( $M = 0.56$ ) ( $B = -1.05$ ,  $SE = 0.29$ ,  $z = -3.65$ ,  $p < 0.001$ , 95%  $CI [-1.61, -0.48]$ ). Meanwhile, children did not perceive stickers and leadership to be different ( $B = 0.34$ ,  $SE = 0.28$ ,  $z = 1.23$ ,  $p = 0.22$ , 95%  $CI [-0.20, 0.88]$ ). We also

found a significant interaction between condition and age,  $\chi^2(1, N = 149) = 4.77, p = 0.03$ . We did not find an interaction between resource and age,  $\chi^2(2, N = 149) = 0.41, p = 0.82$  between resource and condition,  $\chi^2(2, N = 149) = 1.89, p = 0.39$ , or a three-way interaction between resource, condition, and age,  $\chi^2(2, N = 149) = 0.09, p = 0.96$ .

To understand the interaction between age and condition, we conducted generalized linear models to analyze the effect of condition for each age group separately (by median split of age  $M = 7.52$  years). Older children viewed resources in the renewable condition ( $M = 0.39$ ) as less zero-sum than resources in the non-renewable condition ( $M = 0.73$ ) ( $B = -1.39, SE = 0.29, z = -4.87, p < 0.001, 95\% CI [-1.96, -0.84]$ ). Younger children's responses in the renewable condition ( $M = 0.41$ ) were also less zero-sum than in the nonrenewable condition ( $M = 0.54$ ), although the difference was only marginally significant ( $B = -0.52, SE = 0.27, z = -1.90, p = 0.058, 95\% CI [-1.05, 0.01]$ ), Figure 3. These results suggest that similar to adults, renewability of the resources also made a difference in children's zero-sum perceptions of the resources, and the effect grows stronger with age.

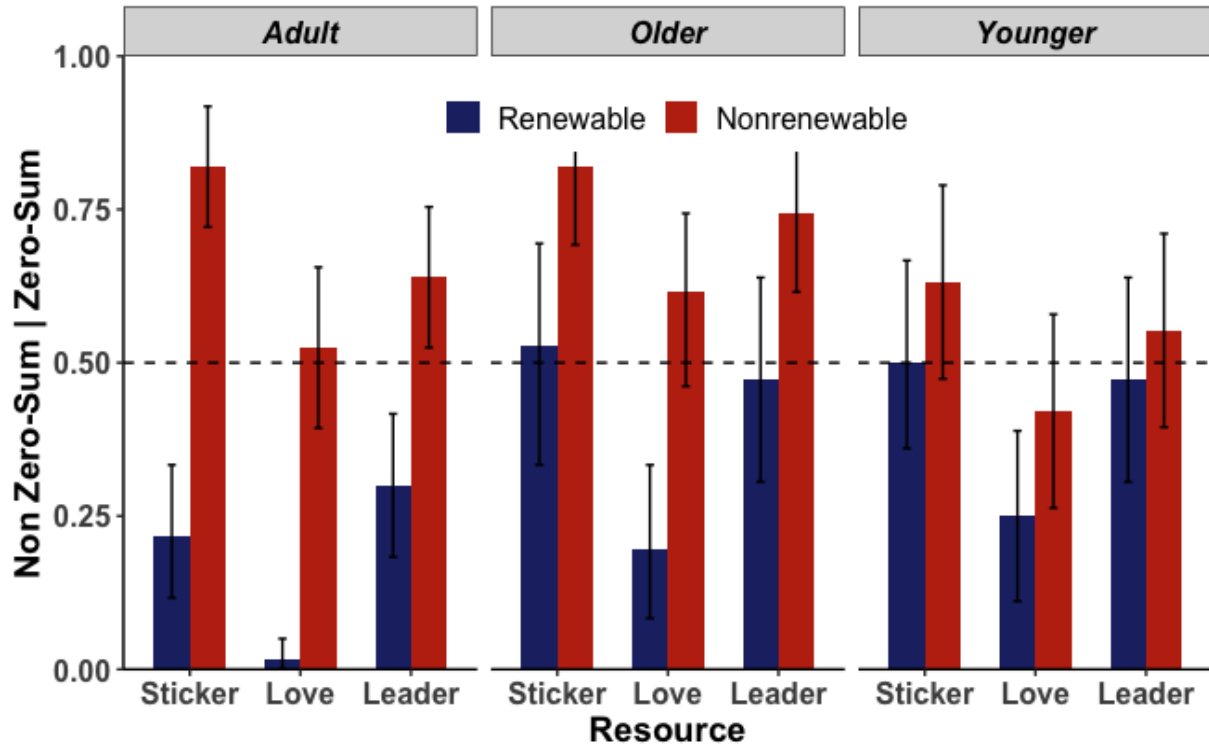


Figure 4. Adult and child zero-sum ratings of renewable and nonrenewable resources. Participants saw renewable versions of resources as less zero-sum than nonrenewable versions.

## Discussion

The findings from both the adult and child samples in Study 2 highlight the role of resource renewability in zero-sum thinking for both material and symbolic resources. Contrary to the inherent property hypothesis (arguing that certain resources are inherently and unchangeable less or more zero-sum), we predicted that presenting participants with information indicating a resource’s renewability or lack thereof would influence zero-sum thinking, such that renewability would decrease zero-sum beliefs, and nonrenewability would increase zero-sum beliefs. Given this, we predicted a clear difference between our two experimental conditions, with renewable versions of resources being perceived as significantly less zero-sum than the nonrenewable versions. Both adults and children responded in a way that was consistent with this hypothesis. We found a main effect of renewability in both samples, where renewable

resources were seen as significantly less zero-sum than nonrenewable resources. We note that we did find that the effect of renewability became stronger with age, with younger children showing only a marginal effect of renewability and older children showing a much more robust response.

These results provide evidence against the inherent property hypothesis and evidence for the renewability hypothesis: we found that perceptions of renewability impacted zero-sum beliefs. These results also suggest a strategy that one can use for reducing zero-sum-thinking—by emphasizing the renewability of resources.

## **General Discussion**

The two studies presented provide a demonstration of the zero-sum intuitions that adults and children have for symbolic resources. In both studies, we examined people's natural thinking for both symbolic and material resources. We found that people generally view symbolic resources as being less zero-sum than symbolic ones. However, this difference was moderated by rivalry. Nonrival symbolic resources such as love and trust were seen in absolute terms as being non zero-sum, similar to how nonrival material resources, air and music, are seen. On the other hand, much more people, sometimes even reaching a statistical majority, viewed rival symbolic resources such as leadership and popularity as being zero-sum. Importantly, the extent to which people saw rival symbolic resources as zero-sum did not reach the consistency with which rival material resources, such as stickers and candy, were seen. In Study 2, we chose to experimentally manipulate the same rivalry that we believed to naturally vary in Study 1 by introducing information that changed the renewability of each resource. The results of Study 2 provided converging evidence with Study 1 by showing that renewable versions of resources were seen as less zero-sum than the nonrenewable versions.

To our knowledge, this is one of the first studies to examine zero-sum beliefs for abstract symbolic resources. While zero-sum intuitions for material goods may be clear, the psychology of how people make zero-sum judgments for resources based on social relationships, such as love, trust, popularity, and leadership, are much more ambiguous. When thinking about symbolic resources, there are no quantities, visible resource exchanges, or clear mechanisms for making (or not making) more of it. In this sense, it may be less obvious whether symbolic resources are zero-sum, where one's gain leads to another's loss. The results of our studies provide a first step of clarity by demonstrating the general norms for how symbolic resources are viewed in terms of being zero-sum. While previous research has found a tendency for people to view wealth, jobs, and other indicators of economic success as zero-sum, our results show that indicators of social success are seen as less of a tug of war. Additionally, our findings also highlight the importance of competitive contexts to symbolic zero-sum beliefs. For example, Burleigh and colleagues found that people perceived love in monogamous relationships to be zero-sum, but did not perceive love in non monogamous relationships to be zero-sum. Knowing that love is generally seen by most as non zero-sum, and that it becomes more zero-sum when it is limited, allows us to better understand how monogamy creates a more competitive environment where love is zero-sum.

We also found that not all symbolic resources were seen similarly. Rival symbolic resources that we hypothesized to be more comparative in nature were seen as more zero-sum. Furthermore, symbolic resources that we explicitly described as being limited were also more zero-sum. This suggests that the inferences we make and the cues (e.g., resource scarcity, competition, relative advantage) we use to determine whether a symbolic resource is zero-sum may be similar to those used for judging material resources. At the same time, findings from

Study 2 showed that even explicitly limited versions of love and trust were not seen to be as zero-sum as a limited material resource. Whether this is due to an anchoring effect, where people are less willing to shift their beliefs away from their default intuitions, or whether it is due to simply nonrenewability not being powerful enough by itself (i.e., it would also need to be tangible/quantifiable, or competed for), is still an open question. Further research can be done to provide a deeper understanding of how these factors shape symbolic zero-sum thinking.

The results of Study 2 also highlight the role of renewability in changing zero-sum beliefs. We presented participants in the renewable and nonrenewable conditions with a simple one sentence description of a mechanism to either make more, or an inability to make more. This had powerful effects on zero-sum beliefs in both directions and provides a potential method for curbing harmful zero-sum thinking in real-world situations. It may not always be clear to individuals whether more of a resource can be made. It may also be that people do know, but aren't actively thinking about it when forming zero-sum beliefs. Simple reminders that a resource is not limited, and that there can be enough for everyone, can be effective for reducing zero-sum thinking when it leads to adverse outcomes. It is also clear that renewability is not the only solution. In other studies, reminding people of peoples' reasons for their choices, or even simply that the context is not zero-sum, has been shown to reduce zero-sum thinking (Johnson et al., 2018; Meegan, 2010).

Compared to the adults, the child data paints a slightly different picture in two ways. When described as renewable, stickers were viewed by most adults as being non zero-sum, while around half of children still saw them as zero-sum. This trend was also observed in the leadership zero-sum beliefs, with a larger percentage of children believing that renewable leadership was still zero-sum compared to adults. This suggests that children may actually be

less flexible than adults when it comes to being influenced by renewability. For instance, it may be that adults have more experience with resources across contexts where they may vary in renewability, whereas children's limited experiences leave them with a more rigid view of how a resource "should be". Interestingly, because this rigidity was only seen for the renewability condition, and not in the nonrenewability condition, we might also infer that children are more open to seeing situations and resources as being more limited than natural, but not so for the opposite. This may come from a natural zero-sum bias that has been argued widely in the literature (Meegan, 2010; Różycka-Tran et al., 2015; Davidai & Ongis, 2019).

Another way in which we examined zero-sum thinking is through a developmental perspective. Across both studies, we find evidence suggesting that children are capable of viewing both symbolic and material resources as being zero-sum. In fact, older children aged 7-9 seem to make zero-sum judgments similarly to that of adults. Younger children aged 5-7 displayed the same overall trends as older children and adults but were closer to the 50/50 midpoint in both directions. Overall, these findings are consistent with a larger body of literature showing the development of sensitivity to competition and scarcity that emerges during this early life period (Shaw et al., 2012; Toppe et al., 2019; Pappert et al., 2016; Echelbarger & Gelman, 2017; Huppert et al., 2020; Rhodes & Brickman, 2011). The similarity of the child and adult data also suggests that experiences that demonstrate zero-sum principles and shape our thinking are powerful, and few are needed to produce the views that we may hold for the rest of our lives. Our understanding of this trajectory would be further aided by additional research on exactly what early experiences are behind this development. However, there were some differences between the child and adult samples in Study 2 that deserve mention. Children, compared to adults, showed a smaller difference between renewable vs. nonrenewable versions of resources.



This smaller sensitivity to contextual renewability might indicate a more rigid view of resources by children. They are less willing to update their zero-sum beliefs for a resource, possibly due to a lack of experience or ability to imagine a situation where more of a limited resource can be made. It would be worth exploring whether other situational drivers of zero-sum thinking, such as perceptions of competition, also see this diminished effect for younger age groups.

## **Chapter 2: Competition and Symbolic Zero-Sum Thinking in the Workplace**

In Chapter 1, I explored zero-sum beliefs for rival and nonrival symbolic resources, how they compare to those for material resources, and the role of renewability in symbolic zero-sum thinking. It appears that people generally see symbolic resources as less zero-sum than tangible material resources. However, there are instances, particularly when a constraint of resource limitation is applied, when symbolic resources also begin to feel more zero-sum. In Chapter 2, I investigate whether a competitive climate leads people to believe that resources are more zero-sum. Many scholars have linked competition and zero-sum beliefs conceptually. Indeed, as described previously, empirical research suggests that zero-sum beliefs arise in situations of threat and resource scarcity (Wilkins et al., 2015; Wilkins et al., 2022; Kuchynka et al., 2018; Sirola & Pitesa, 2017; Ongis & Davidai, 2022). However, as far as we know, there has not been any research directly testing whether a competitive climate causes more zero-sum beliefs. Because contemporary workplaces are growing increasingly competitive, and both academics and practitioners have become more interested in understanding how this competition shapes the way employees perceive their organizations, perform at work, and interact with their coworkers, we will investigate zero-sum beliefs in the context of workplace climate.

In both hypothetical and real organizations, competitive work environments have been shown to have both positive (performance, commitment, organizational identification, job efficacy) and negative effects (unethical behaviors, stress, workaholism, turnover, distress) on individuals (Elliot et al., 2017; Plouffe et al., 2010; Schrock et al., 2016; Mael & Ashforth, 1992; Arnold et al., 2009; Bellizzi, 1995; Hochstein et al., 2017; Kilduff et al., 2016; Fletcher et al., 2008; Keller et al., 2016; Gim et al., 2015; Turel & Gaudio, 2018; Kalra et al., 2020). Zero-sum thinking may be an additional consequence of competition, and the causes and impacts of

workplace zero-sum thinking have begun to receive more attention in recent years. For example, reading about macroeconomic downturn leads employees to have a more zero-sum construal of success, which in turn makes them less likely to help others at work (Sirola & Pitesa, 2017). A different study also found that individuals who see workplace success as being more zero-sum adapt better to new workplaces, are able to cope better with changes, and show stronger ability to learn new skills (Zhang & Sun, 2020). In another domain, men who work for companies with stronger masculinity contest norms reported observing stronger bias against women in the workplace, an effect mediated by an increase in their own zero-sum thinking. This suggests that women's presence in workplaces high in masculinity contest norms activates men's competitive, gender-based zero-sum beliefs. In turn, this zero-sum thinking may motivate defensive responses such as tolerance for disrespectful and paternalistic treatment of women. Importantly, this data was correlational, highlighting the need for more research on these dynamics. However, a second study from this same paper directly manipulated women's status gains and found that male college students who read about information that threatened the gender status hierarchy (describing gains that women have made over the past century) showed reduced support for policies addressing gender inequality, and that this effect was mediated by an increase in zero-sum thinking (Kuchynka et al., 2018). All in all, these findings show that workplace zero-sum thinking has implications for both social and business outcomes, and that certain situational cues, particularly indicators of resource scarcity or threats to status hierarchy, can lead to employees to perceiving resources as being more zero-sum.

However, general perceived competition that occurs more chronically on a day-to-day basis may also foster zero-sum beliefs. For example, members of high status-groups (whites) were more likely to express concerns about unfair treatment and anti-white discrimination after

reading recruitment materials from a company that valued (vs. did not mention) diversity. Additionally, white men also exhibited a cardiovascular threat profile and made poor impressions while interviewing at pro-diversity company. In contrast, members from low status groups did not show any of these reactions (Dover et al., 2016). While diversity is certainly not a direct analogue to competition, this paper shows that an individual's overall impression of competition or threat in their work environment may be enough to elicit behavior indicating a zero-sum perspective. In Chapter 2, I aim to unpack this possibility further by examining how simply describing a workplace climate as competitive may lead to greater zero-sum thinking. By doing so, I hope to provide a better understanding of how everyday perceptions of one's climate may affect inferences and, in particular, how workplace competition may actually be leading employees to see gains for one person as leading to losses for another.

Another key focus of Chapter 2 is to continue to examine zero-sum thinking with regard to symbolic resources. Here, I focus on the workplace. Existing research on workplace zero-sum beliefs have mostly asked participants about non-symbolic resources (e.g., economic gains, wealth, employment, jobs). These resources, what I will refer to as material resources, may or may not be limited in reality. However, just as these material resources are markers of economic success, there are many resources, what I will refer to as symbolic resources, that are markers of social success. Such resources include respect, freedom, being heard, and cultural values. While lay intuitions for symbolic resources might suggest that symbolic resources should not be limited, there is a lack of empirical evidence for how something like respect is actually distributed in the workplace. Following the tradition within psychological research that emphasizes the meaning people assign to social situations (Asch, 1948; Davidai et al., 2012; Griffin & Ross, 1991), I suggest that subjective beliefs about symbolic resources may be

influenced by workplace competition, and that these beliefs have strong implications for key workplace behaviors.

There is reason to suspect that symbolic beliefs may feel more zero-sum in competitive climates. While the findings from Chapter 1 show that people normally see symbolic resources as being non zero-sum, Study 1.2 was able to shift symbolic zero-sum beliefs by describing resources as renewable or nonrenewable. This demonstrated that symbolic zero-sum beliefs are sensitive to context-dependent information and calls into question what other situational factors might influence these perceptions. It has been shown that reading about economic downturn causes employees to hold a stronger zero-sum construal of success (Sirola & Pitesa, 2017). While this and similar studies measure workplace success in terms of economic outcomes (economic gains, wealth, jobs), I contend that success at work may also include symbolic outcomes, such as being respected by one's colleagues, having one's opinions valued, and feeling included. Just as economic downturn leads to a stronger zero-sum construal of economic success, perceiving a competitive climate may lead to a stronger zero-sum construal of symbolic success (alongside stronger material zero-sum beliefs as well). In Chapter 2, I test this hypothesis by examining whether describing companies as having a competitive work climate (vs. a neutral or collaborative climate) leads people to believe that both material and symbolic resources are more zero-sum.

### **Pilot**

Given the lack of literature on symbolic zero-sum beliefs in the workplace, we wanted to conduct an initial pilot study to 1) Assess differences in various operationalizations of zero-sum thinking, and 2) Compare symbolic zero-sum beliefs, absent of any contexts, to material zero-sum beliefs.

## Method

*Participants.* We collected data from 1301 subjects. We excluded 119 subjects due to failed attention or comprehension checks, resulting in a final total of 1182 subjects.

*Design and Procedure.* We measured participants' perceptions of 15 material and 15 symbolic resources along 4 dimensions: how *zero-sum*, *hydraulic*, *limited*, and *fixed* they were. Participants were randomly assigned to one of four conditions: Zero-sum, Hydraulic, Limited, and Fixed. In the Zero-Sum and Hydraulic conditions, participants read information describing various ways that gains and losses can be structured, two of which were zero-sum and hydraulic outcomes. The zero-sum outcome was defined as "when one person gains a certain amount, the other loses by that same amount". The hydraulic outcome was similar but was not specific about amounts: "When one person gains, the other loses, but not necessarily by that same amount."

In the Limited and Fixed conditions, participants read information describing 3 possible ways that resources can be structured: Fixed, Limited, and Unlimited. The Fixed structure was defined as "There is a set amount that does not change. When it is being used, there is exactly the same amount less available for others". The Limited structure was defined as "There is only so much that can go around. When it is being used, it leaves less for others."

After being introduced to the 4 concepts of interest and completing a set of comprehension checks, participants responded with their agreement on a scale of 30 items, asking how much they thought each resource was zero-sum, hydraulic, limited, or fixed (according to the assigned condition).

## Results

Overall, participants rated the 15 symbolic resources ( $M = 2.05$ ) as being less zero-sum than the 15 material resources ( $M = 2.81$ ),  $t(224) = -16.25$ ,  $p < 0.001$ . This same pattern applied to

the other 3 dimensions as well, with symbolic resources being rated consistently lower than the scale midpoint, and material resources not being rated significantly below the scale midpoint. This suggests that symbolic resources are viewed as less zero-sum than material resources as well as *not* zero-sum in a more absolute sense.

To test whether the resources that are more zero-sum also tend to be more hydraulic, limited, and fixed, we correlated the average scores for all 30 resources across the four DVs. Zero-sum scores were highly correlated with the other 3 DVs, suggesting that zero-sum intuitions are conceptually similar to intuitions that something is hydraulic, limited, and fixed.

	Zero-Sum	Hydraulic	Limited	Fixed
<b>Symbolic Resources</b>				
Respect*	1.76	1.91	1.94	1.90
Freedom*	1.84	1.90	2.19	2.02
Space for Cultural Values*	2.27	2.47	2.25	2.18
Celebrating Holidays*	1.84	1.76	3.04	3.15
Being Heard*	2.39	2.88	2.70	2.05
Freedom of Expression*	1.89	1.88	1.92	1.94
Tolerance	1.88	1.93	2.19	1.98
Fairness	1.91	2.09	2.02	1.96
Sense of Belonging	1.92	1.97	1.90	1.94
Trust	1.82	1.83	2.28	2.04
Loyalty	1.97	2.08	2.07	1.97
Privacy	1.89	1.77	2.53	2.34
Popularity	2.56	2.93	2.77	2.02
Love	1.71	1.98	1.74	1.70
Recognition	2.50	2.92	2.46	2.00
<b>Material Resources</b>				
Economic Gains*	3.04	3.37	3.44	2.61
Workplace Trainings*	2.08	2.42	3.44	2.94
Job Opportunities*	3.39	3.74	4.44	3.12
Money*	3.22	3.59	4.05	2.96
Promotions*	3.56	4.03	4.33	3.40
Food	3.20	3.52	4.15	2.89
Fresh Water	3.27	3.45	4.20	3.36
Housing	3.14	3.26	4.32	3.17
Physical Space	3.96	4.07	4.38	4.10
Air	2.41	2.37	1.50	1.86
Education	1.90	2.06	2.38	2.20
Electricity	2.53	2.60	3.58	2.80
Sunlight	1.91	1.65	1.92	2.73
School Performance	1.73	1.82	2.23	1.94
Employment	3.32	3.42	4.24	3.02

Table 1. Ratings of 30 resources on each category of question, from 1-7.

\*indicates resources used in Studies 2.1-2.5.

## Study 2.1

In the pilot study we found that people generally don't respond differently to zero-sum vs. hydraulic statements, and limited vs fixed statements. Therefore, in Study 2.1 we decided to use hydraulic statements for our zero-sum beliefs scale because they were more general than zero-sum statements. Consistent with findings from Chapter 1, we also observed that symbolic resources were generally perceived as less zero-sum than material resources.

In Study 2.1 we examine the effect of workplace competition on zero-sum thinking, both material and symbolic. We had an online sample of participants read about a fictional company with either a competitive, collaborative, or neutral work environment. Following this manipulation, we measured their zero-sum beliefs about material and symbolic resources using a novel zero-sum belief scale (adapted from Kuchynka et al., 2018).

### Method

*Participants.* Five hundred and two U.S. residents who were recruited from Amazon's Mechanical Turk completed the study. After excluding participants who failed the attention checks, we arrived at a final sample size of 467 participants (222 females, 243 males, 2 Other; Mean Age = 38.71; 80% White, 9% Black, 5% Asian, 2% Hispanic or Latino, 4% Other).

*Materials and Procedures.* The study was described to participants as a study about attitudes towards organizational messages. Participants were randomly assigned to one of three work environment conditions (competitive, collaborative, neutral). In each condition, participants first were told to imagine that they worked at a company called Cast Technologies. Then, participants read a brief description of the work environment at Cast.



In the competitive condition, the work environment was described as competitive (e.g., employees should prove they are the best, the most talented employees allow the firm to thrive, employees see each other as competitors).

In the collaborative condition, the work environment was described as collaborative (e.g., employees are working together to improve, a collaborative workforce allows the firm to thrive, employees see each other as partners and team members).

In the neutral condition, the work environment was described as valuing professionalism and competence (e.g., employees focus on excellence, a motivated and productive workforce allows the firm to thrive, Cast fosters a productive work environment, employees see each other as professional and competent colleagues).

After reading the vignette, participants responded to two comprehension check questions assessing their understanding of the company. After reading the vignettes, endorsement of zero-sum beliefs was measured using the zero-sum beliefs scale. Following the zero-sum beliefs scale, participants responded to a single question asking whether they considered the work environment at Cast as competitive or collaborative (1-7 Entirely competitive to Entirely collaborative).

#### *Zero-Sum Belief Scale*

The scale was created by selecting 12 resources (6 material, 6 symbolic) that were relevant to a workplace (tested in the pilot study). These 12 resources were then made into hydraulic statement form, such that “when certain employees get more of one resource, there is less of that resource for other employees”. Participants were asked to rate how much they agreed (1-7 Strongly disagree to Strongly agree) with these statements.

Example material zero-sum item: “Money spent on services for certain employees at Cast means less money for services for other employees.”

Example symbolic zero-sum item: “When certain employees are given more respect, others may get less than they are used to getting.”

## **Results**

*Zero-Sum Belief Scale.* To explore the factorial structure of our zero-sum beliefs scales, all 12 zero-sum belief items ( $\alpha = 0.94$ ) were subjected to factor analysis with varimax rotation which indicated that two factors gave the most interpretable solution. The two factors explained a total of 64.7% of the variance. Factor 1 consisted of 6 items, was labeled material zero-sum beliefs ( $\alpha = 0.91$ ) and explained 36.7% of the variance. Factor 2 consisted of 6 items, was labeled symbolic zero-sum beliefs ( $\alpha = 0.94$ ) and explained 28.0% of the variance. Furthermore, a Scree test provided additional support for the two-factor solution, with only 2 factors holding an Eigenvalue above 1. To prepare the zero-sum beliefs items for analysis, we created a mean score for overall zero-sum beliefs (all 12 items), a mean score for material zero-sum beliefs (6 material items), and a mean score for symbolic zero-sum beliefs (6 symbolic items).

*Manipulation Check.* For the purposes of interpretation, we recoded the responses to the perceived competition item so that higher valued would reflect greater perceived competitiveness. We conducted a one-way ANOVA to examine whether work environment condition had an effect on perceptions of competition at Cast. The ANOVA revealed a significant variation amongst the 3 work environment conditions,  $F(2, 464) = 290.7, p < 0.001$ . Post hoc Tukey tests showed that participants in the competitive condition ( $M = 5.62$ ) rated the work environment at Cast as more competitive compared to participants in both the collaborative

( $M = 2.10, p < 0.001$ ) and excellence ( $M = 3.00, p < 0.001$ ) conditions. Furthermore, the collaborative condition was rated as more collaborative than the neutral condition,  $p < 0.001$ .

*Zero-Sum Beliefs.* To determine whether work environment affected overall zero-sum belief endorsement a one-way ANOVA was conducted. A significant effect of condition emerged, such that participants endorsed zero-sum beliefs the most in the competitive condition,  $F(2, 464) = 25.31, p < 0.001$ . Post hoc Tukey tests found that this effect persisted when comparing the competitive condition ( $M = 3.99$ ) to the collaborative ( $M = 3.03, p < 0.001$ ) and neutral ( $M = 3.25, p < 0.001$ ) conditions individually. Furthermore, the collaborative and neutral condition were not significantly different from one another in terms of zero-sum beliefs,  $p = 0.27$ .

To test whether competition influence endorsement of the two zero-sum beliefs subscales differently, we ran a 2-way mixed ANOVA with work environment as the between-subjects factor and subscale as the within-subjects factor. There was no significant interaction of condition between work environment and subscale,  $F(2, 464) = 1.39, p = 0.25$ , indicating that competition had a similar effect on both material and symbolic zero-sum beliefs. Follow-up paired t-tests found a main effect of work environment, as described above, as well as a main effect of subscale, such that participants endorsed material zero-sum beliefs ( $M = 3.83$ ) more than symbolic zero-sum beliefs ( $M=3.02$ ),  $p < 0.001$ .



Figure 5a. Overall Zero-Sum Beliefs by work environment condition. Participants who read about a competitive version of Cast showed greater zero-sum beliefs.

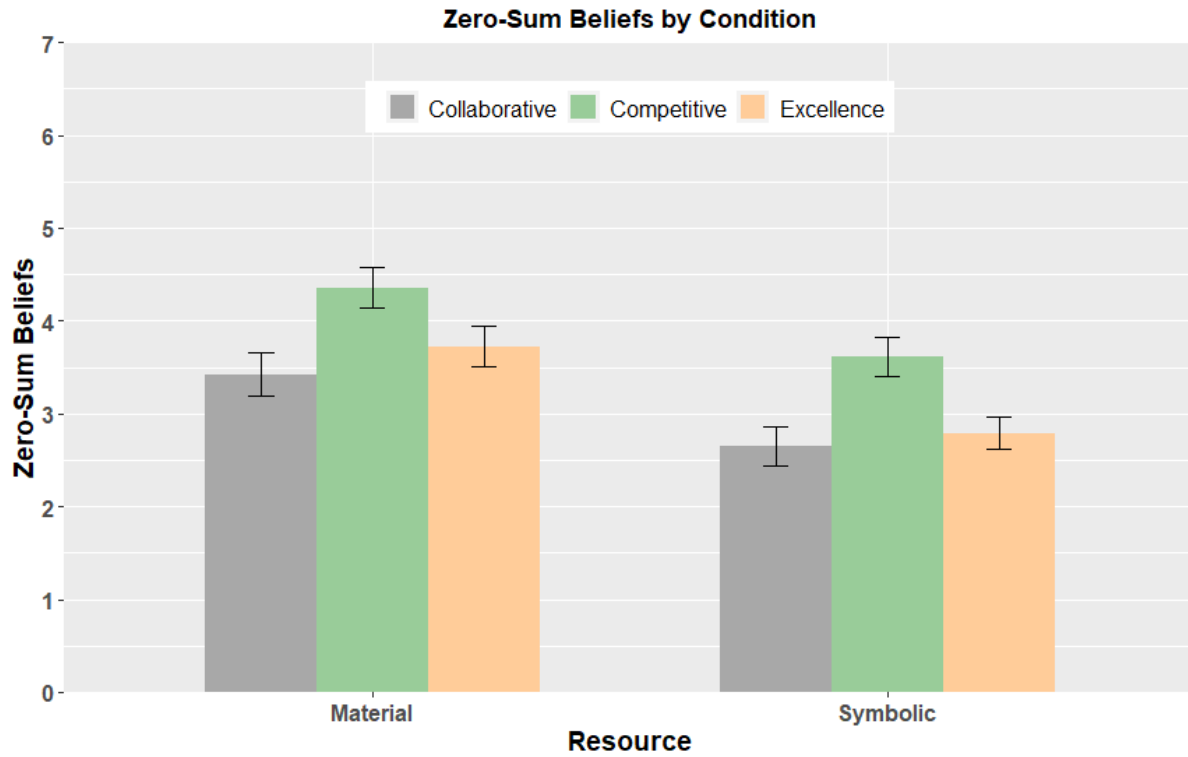


Figure 5b. Material and Symbolic Zero-Sum Beliefs by work environment condition. Participants who read about a competitive version of Cast showed greater zero-sum beliefs.

## **Discussion**

To our knowledge, this is one of the first studies to examine how zero-sum beliefs, particularly symbolic zero-sum beliefs, may vary based on one's workplace climate. We observed that after reading about a version of Cast where the work climate was described as competitive (compared to collaborative or excellence climates), people held stronger zero-sum beliefs for both material and symbolic resources. Our analysis showed no difference between the effect of competition on material zero-sum beliefs versus symbolic zero-sum beliefs. This suggests that competitive environments may lead people to hold a zero-sum construal (Sirola & Pitesa, 2017) for a wide range of outcomes, including those that are more visibly limited (money), as well as those that need not be limited (respect). It is important to note that we do not claim whether the increase in symbolic zero-sum beliefs is accurate or inaccurate. In fact, it may be very easy to imagine scenarios where competitive climates do indeed make symbolic resources become more zero-sum. Instead, what our results speak to is the subjective perception that these resources are more zero-sum, that one's gain leads to someone else's loss. This belief, we argue, is sensitive to the competitive climates that we experience on a daily basis both in and out of the workplace, a finding which advances our understanding of how our zero-sum beliefs are shaped by the world around us.

## **Study 2.2**

In Study 2.1, the material and symbolic zero-sum belief items were presented together in the same scale. It is possible that the similar effects of our manipulation on material and symbolic zero-sum beliefs were a result of participants responding to all 12 items together as a group. In Study 2.2, we sought to replicate the findings from Study 2.1 and test that our competition manipulation could independently shift both material and symbolic zero-sum

beliefs. To do this, we ran a very similar study but presented the material and symbolic zero-sum beliefs scales separately between subjects.

## **Method**

*Participants.* Nine hundred U.S. residents who were recruited from Amazon's Mechanical Turk completed the study. After excluding participants who failed the attention checks, we arrived at a final sample size of 844 participants (373 female, 464 male, 7 Other; Mean Age = 37.72; 73% White, 10% Black, 7% Asian, 4% Hispanic or Latino, 6% Other).

*Materials and Procedure.* Study 2.2 utilized an identical design as Study 2.1 with one exception. Instead of the material and symbolic zero-sum belief items being presented together, they were instead separated into between-subjects scales, such that each participant only saw either the material subscale, or the symbolic subscale.

## **Results**

*Manipulation Check.* Similar to Study 1a, participants in the competitive condition ( $M = 5.59$ ) perceived the environment at Cast to be more competitive than participants in the collaborative ( $M = 2.12$ ) and excellence ( $M = 2.74$ ) conditions,  $F(2, 841) = 561.7, p < 0.001$ .

*Zero-Sum Beliefs.* We conducted one-way ANOVAs to test for effects of work environment condition on both material and symbolic zero-sum beliefs. For material zero-sum beliefs, we found a significant effect of condition,  $F(2, 421) = 38.16, p < 0.001$ . Post hoc Tukey tests showed that participants in the competitive condition ( $M = 4.84$ ) perceived material resources to be more zero-sum than participants in the collaborative ( $M = 3.48, p < 0.001$ ) and excellence ( $M = 3.88, p < 0.001$ ) conditions. Additionally, the difference in material zero-sum belief endorsement between the collaborative and excellence conditions was also statistically significant,  $p < 0.05$ . As for symbolic zero-sum beliefs, we again observed a significant effect of

work environment,  $F(2, 417) = 16.54, p < 0.001$ . Post hoc Tukey tests revealed that participants endorsed symbolic zero-sum beliefs more in the competitive ( $M = 3.80$ ) condition compared to the collaborative ( $M = 2.95$ ) and neutral ( $M = 2.95$ ) conditions, but there was no difference between the latter two conditions,  $p = 0.99$ .

Due to the material and symbolic subscales being presented separately between-subjects, we ran a 3x2 ANOVA (work environment x subscale) with zero-sum beliefs as the dependent variable. Similar to Study 1a, we found a main effect of work environment,  $F(2, 838) = 55.05, p < 0.001$ , such that participants in the competitive condition endorsed zero-sum beliefs more in the competitive condition ( $M = 4.35$ ) compared to both the collaborative ( $M = 3.19$ ) and control condition ( $M = 3.43$ ). We also found a main effect of subscale condition, such that participants endorsed material zero-sum beliefs items more than symbolic zero-sum beliefs,  $F(1, 838) = 77.04, p < 0.001$ . We did not find a significant interaction between work environment and subscale,  $F(2, 838) = 2.56, p = 0.08$ .

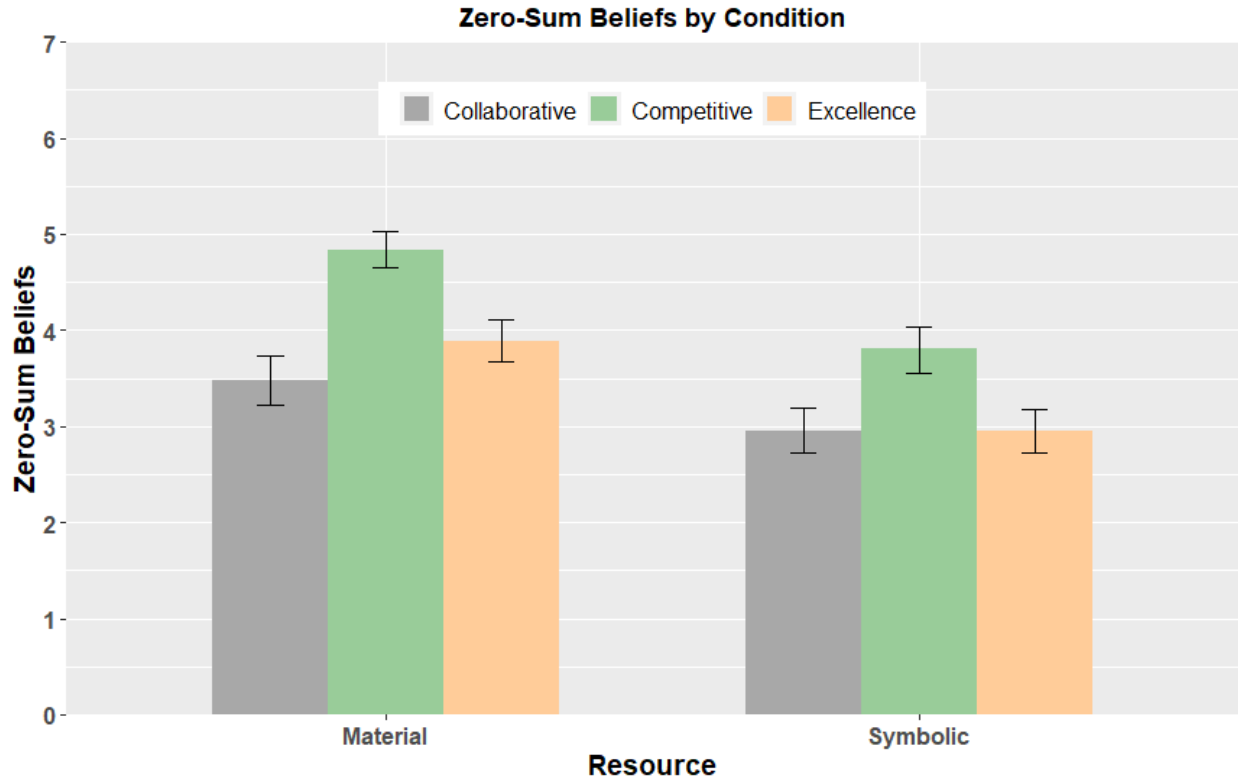


Figure 6. Material and Symbolic Zero-Sum Beliefs by work environment condition. Participants who read about a competitive version of Cast showed greater zero-sum beliefs.

## Discussion

In Study 2.2, we replicated the findings from Study 2.1 and found that reading about a competitive work environment led people to perceive both material and symbolic resources as being more zero-sum. Importantly, because we presented our subscales separately between-subjects, we were able to rule out the explanation of symbolic zero-sum beliefs increasing alongside material zero-sum beliefs. This demonstrates that symbolic zero-sum beliefs themselves are shaped by the extent to which we see our work environments as competitive.



### Study 2.3

In Studies 2.1 and 2.2, we found that individuals who imagined working at a company described as having a competitive work environment held stronger zero-sum beliefs than those who imagined a company with a collaborative or excellence-oriented work environment. Importantly, this difference between conditions was shown for both material and symbolic zero-sum beliefs. To follow up on these results, we sought to understand why a competitive work climate would lead to greater symbolic zero-sum thinking. In previous research, zero-sum thinking has been associated with threat to one's own status and values. Additionally, zero-sum beliefs also lead to efforts to increase one's own competitiveness relative to others, particularly when favoring an ingroup vs. outgroup (Esses et al., 2001; Wilkins et al., 2015; Wilkins et al., 2021). Therefore, it may be that zero-sum beliefs have a self-serving function for motivating and/or justifying, behavior that protects and advances one's own status. In Study 2, we test this *motivation* hypothesis by introducing a perspective condition to our design, where participants either read about Cast from a first-person perspective (they work at Cast) or from a third-person perspective (they don't work at Cast).

Ultimately, Study 3 used a similar design as Study 2 but introduced two key changes. First, the neutral work environment condition from Study 1 was not included due to how similar it was to the collaborative condition in both manipulating work environment and affecting zero-sum beliefs. This left two between subjects work environment conditions, competition and collaboration. The second change was that a first- and third-person perspective were introduced as two additional work environment conditions, resulting in a 2x2 (work environment x perspective) design. Across these four conditions, we expected to find a main effect of work environment, such that participants endorsed zero-sum beliefs more in competition than in

collaboration (replicating Studies 2.1 and 2.2). In addition, if the effects of a competitive climate on zero-sum beliefs are the result of people feeling motivated to protect their own resources, then we would expect an interaction between work environment and perspective, where the effect of competition on zero-sum beliefs would be stronger for participants in the first-person condition.

## **Method**

*Participants.* One thousand two hundred and two participants completed the study via Amazon's mechanical turk in exchange for a small payment. Of these participants, 86 were excluded from analyses due to failed attention or comprehension checks, resulting in a final sample of 1116 participants (373 female, 464 male, 7 Other; Mean Age = 40.99; 75% White, 10% Black, 6% Asian, 3% Hispanic or Latino, 6% Other).

*Design and Procedure.* Participants were randomly assigned to one of four conditions: Competitive 1<sup>st</sup> person, Competitive 3<sup>rd</sup> person, Collaborative 1<sup>st</sup> person, Collaborative 3<sup>rd</sup> person. In each condition, participants read a description of the company Cast Technologies. After reading this description, participants responded on a scale from 1 (completely an insider) to 7 (completely an outsider) whether they felt more like an insider or an outsider at Cast Technologies. After reading the vignettes, participants responded with their agreement to the 12 item zero-sum belief scale. After the demographics section, the survey ended, participants were thanked for their participation, and provided an MTurk completion code.

The perspective of the participant was manipulated in three ways. The first manipulation took place when participants were introduced to Cast Technologies. In the first-person conditions, participants were told to imagine that they were an employee at the company Cast Technologies. In the third-person conditions, participants were told to imagine that they were an outside contractor hired to evaluate the company culture at Cast Technologies. The second

manipulation took place within the vignettes. In the first-person conditions, the company descriptions used first-person pronouns that addressed the participant themselves (e.g., Welcome to Cast, You are joining a company, An opportunity for you, We believe that our employees, Your talent and hard work, etc.). Additionally, participants were shown a personalized company badge alongside the vignette with their first name and last initial and current location. In the third-person conditions, the company descriptions used third-person pronouns and did not address the participant themselves (e.g., did not welcome participants to the company, Cast believes that their employees, Cast's employees see each other as, thank you for taking the time to learn more about Cast, etc.). Instead of seeing a personalized company badge alongside the vignette, participants in the third person condition saw the company logo. The third and final way that perspective was manipulated was in the zero-sum beliefs scale instructions. In the first-person condition, participants were asked "When you consider what it would be like to work at Cast Technologies...". In the third-person condition, participants were asked "When making your evaluations of the work environment at Cast Technologies...".

## **Results**

*Manipulation Check.* To measure whether the perspective manipulation indeed shifted participants' perspectives, we asked participants how much of an insider (or outsider) they felt like with regards to Cast. A one-way ANOVA showed that participants felt like more of an insider in the first-person condition ( $M=3.28$ ) compared to the third-person ( $M=4.00$ ) condition,  $F(1, 1114) = 56.22, p < 0.001$ . Consistent with previous studies, we also found that participants in the competitive condition ( $M = 2.61$ ) perceived the work environment to be more competitive than those in the collaborative condition ( $M = 5.75$ ),  $F(1, 1114) = 1613, p < 0.001$ .

*Motivation Hypothesis.* To test the *motivation* hypothesis, we conducted a three-way mixed ANOVA to assess the effects of work environment, perspective, and subscale on zero-sum beliefs. Replicating the previous studies, we found a significant main effect of work environment, such that participants in the competitive conditions ( $M = 4.03$ ) endorsed zero-sum beliefs more than those in the collaborative conditions ( $M = 3.16$ ),  $F(1, 1112) = 137.26, p < 0.001$ . We also found a main effect of subscale, such that participants endorsed material zero-sum beliefs ( $M = 4.00$ ) more than symbolic zero-sum beliefs ( $M = 3.19$ ),  $F(1, 1112) = 709.73, p < 0.001$ . We did not find a main effect of perspective,  $F(1, 1112) = 2.58, p = 0.11$ . Additionally, we did not find a significant interaction between perspective and work environment,  $F(1, 1112) = 0.53, p = 0.47$ , or perspective and scale,  $F(1, 1112) = 0.05, p = 0.82$ . However, we did find a significant two-way interaction between work environment and subscale,  $F(1, 1112) = 9.99, p = 0.002$ . To understand this interaction, we conducted follow-up one-way ANOVAs to examine the effect of work environment on material and symbolic zero-sum beliefs separately. We found that although both were statistically significant, the difference between competitive and collaborative conditions was greater for material zero-sum beliefs,  $F(1, 1114) = 144.45, p < 0.001$ , than that for symbolic zero-sum beliefs, ( $M = 2.81$ ),  $F(1, 1114) = 102.20, p < 0.001$ .

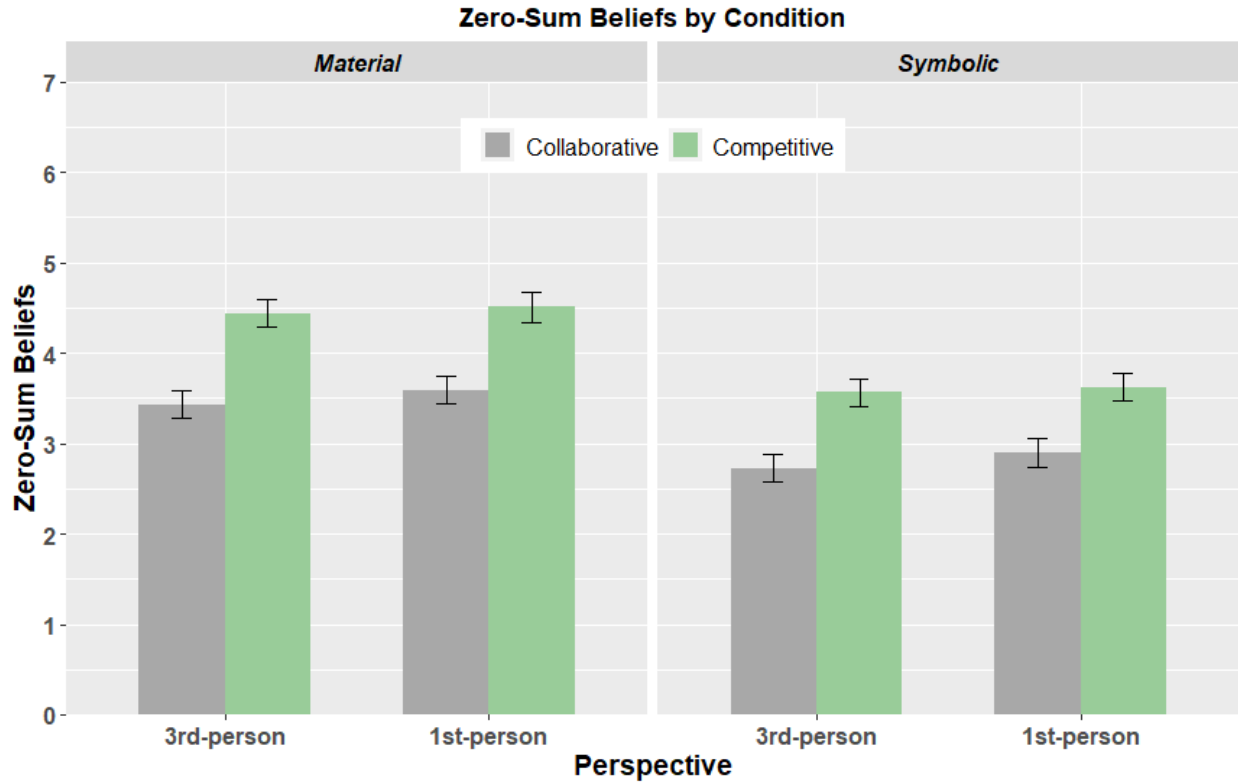


Figure 7. Zero-Sum Beliefs by work environment x perspective. No significant differences between 1<sup>st</sup> and 3<sup>rd</sup> person conditions.

## Discussion

We found that perspective does not seem to play a role in zero-sum thinking.

Participants' zero-sum beliefs in both the competitive and collaborative work environments did not differ based on whether they imagined themselves working at Cast, or imagined themselves as a third-party evaluator. While this is inconsistent with the broader literature suggesting that zero-sum beliefs serve a system defense or motivational function (Wilkins et al., 2015; Kuchynka et al., 2018; Chernyak-Hai & Davidai, 2022), there are a few possibilities for why our results diverge. First, it may simply be that our experimental conditions between first- and third-person perspectives were not different enough. Although participants in the first-person

condition did feel like more of an insider, this difference was ultimately less than a full point on a 7-point scale. Second, it is also possible that with an online sample participants might not truly imagine themselves to be employees at Cast in any situation. It is well-documented that zero-sum beliefs are often driven by the perceived potential losses that someone can experience when others make gains (Roberts & Davidai, 2021; Wilkins et al., 2015; Wilkins et al., 2021). Therefore, if participants did not feel that their resources were at stake, then perspective would not have made a difference. Third, it could be differences in how zero-sum beliefs were measured between studies. For example, Kuchynka et al., 2018 found that perceived threat (that women are making gains) led to increased endorsement, by men, of zero-sum statements such as “The more money that women earn in the workplace, the less money men earn”. This statement asks specifically about the relationship between men vs. women. Meanwhile, our zero-sum beliefs scale items ask about general relationships between employees, nonspecific. Therefore, it is possible that even if participants in the first-person conditions imagined themselves as real Cast employees, that they didn’t see themselves as the ones to lose from any potential zero-sum situation at work, at least any more than people in the third-person conditions.

## **Study 2.4**

Study 2.3 found a lack of support for a motivation hypothesis. In Study 2.4 we examine another potential driver of symbolic zero-sum beliefs: perceived resource limitation. Past research has argued that perceived resource limitation/scarcity, both chronic and temporary, can foster zero-sum beliefs (Wilkins et al., 2021; Ongis & Davidai; Meegan et al., 2010; Różycka-Tran et al., 2015; Boyer & Petersen, 2018; Foster, 1965). Additionally, a cognitive heuristic brought about by perceived competition for scarce resources may cause people to overgeneralize zero-sum beliefs to unlimited resources (Meegan, 2010). If people feel that competitive work

environments lead to limited resources, they may generalize this inference to symbolic resources as well, such that respect and freedom end up feeling more zero-sum. In Study 2.4 we explore this *cognitive inference* hypothesis by measuring participants' beliefs about resource limitation at Cast along with their zero-sum beliefs. To find support for the cognitive inference hypothesis, we would expect to find that limited beliefs mediate the relationship between competition and zero-sum beliefs.

## **Method**

*Participants.* Five hundred and ninety-seven participants completed the study via Amazon's mechanical turk in exchange for a small payment. Of these participants, 57 were excluded from analyses due to failed attention or comprehension checks, resulting in a final sample of 542 participants (218 female, 322 male, 2 Other; Mean Age = 37.55; 71% White, 9% Black, 7% Asian, 6% Hispanic or Latino, 7% Other).

*Design and Procedure.* As in Study 2, participants were randomly assigned to either the competitive or collaborative condition, but here, everyone was assigned to take a 3<sup>rd</sup> person perspective for evaluating Cast Technologies. After reading the vignettes, endorsement of limited beliefs and zero-sum beliefs were measured using 2 separate scales.

To assess beliefs that a resource is limited, participants responded to a 12 item Limited Beliefs scale. Participants were asked to rate how much they agreed (1-7 Strongly disagree to Strongly agree) with 12 statements describing 6 material and 6 symbolic resources at Cast Technologies. The 12 statements were presented in a randomized order.

Example material Limited item: "Money spent on services for employees at Cast is limited. There is only so much money for services to go around."

Example symbolic limited item: “Respect for employees at Cast is limited. There is only so much respect to go around.”

## Results

*Zero-Sum Beliefs.* We conducted a 2x2 mixed ANOVA to assess the effects of work environment condition and subscale on zero-sum beliefs. We observed main effects of both work environment and subscale, such that participants in the competitive condition ( $M = 4.38$ ) endorsed zero-sum beliefs more than participants in the collaborative condition ( $M = 3.04$ ),  $F(1, 540) = 141.93, p < 0.001$ , and participants endorsed material zero-sum beliefs ( $M = 4.05$ ) more than symbolic zero-sum beliefs overall ( $M = 3.38$ ),  $F(1, 540) = 276.06, p < 0.001$ . We also found a significant two-way interaction between work environment and subscale,  $F(1, 540) = 5.70, p = 0.02$ . Follow-up one-way ANOVAs revealed that the effect of competition was greater for material zero-sum beliefs,  $F(1, 1082) = 297.57, p < 0.001$ , than for symbolic zero-sum beliefs,  $F(1, 1082) = 210.20, p < 0.001$ .

*Limited Beliefs.* We conducted the same analysis but with limited beliefs as the dependent variable instead. We found significant main effects of both work environment and subscale, such that participants in the competitive condition ( $M = 4.35$ ) endorsed limited beliefs more than participants in the collaborative condition ( $M = 3.21$ ),  $F(1, 540) = 105.71, p < 0.001$ , and participants endorsed material limited beliefs ( $M = 4.19$ ) more than symbolic limited beliefs ( $M = 3.38$ ),  $F(1, 540) = 267.07, p < 0.001$ . We did not find a significant two-way interaction between work environment and subscale,  $F(1, 540) = 0.53, p = 0.47$ .

*Mediation Analysis.* A central hypothesis of Study 2.4 was that the perception that resources are limited might explain the effect of competition on zero-sum beliefs. To assess this possibility, we conducted a causal mediation analysis with the R Mediation Package (Tingley et



al., 2014). The effect of work environment on zero-sum beliefs was partially mediated by the endorsement of limited beliefs. As Figure 8a illustrates, the regression coefficients between work environment and zero-sum beliefs and between limited beliefs and zero-sum beliefs were both significant. The indirect effect was  $(1.14) \times (0.85) = 0.97$ . Unstandardized indirect effects were computed using 1,000 bootstrapped samples, and the 95% confidence interval ranged from 0.79 to 1.17, indicating a significant indirect effect ( $p < 0.001$ ). This partial mediation held when the material and symbolic limited beliefs scales were substituted in as the dependent variables in the model. We also tested for reverse mediation, where zero-sum beliefs explain the relationship between competition and the perception that resources are limited. Using the same method of analysis, we found that the effect of competition on overall limited beliefs was fully mediated via zero-sum beliefs. The indirect effect was  $(1.33) \times (0.84) = 1.12$ . The 95% confidence interval ranged from 0.93 to 1.31, indicating that the full mediation was statistically significant,  $p < 0.001$ , see Figure 8b.

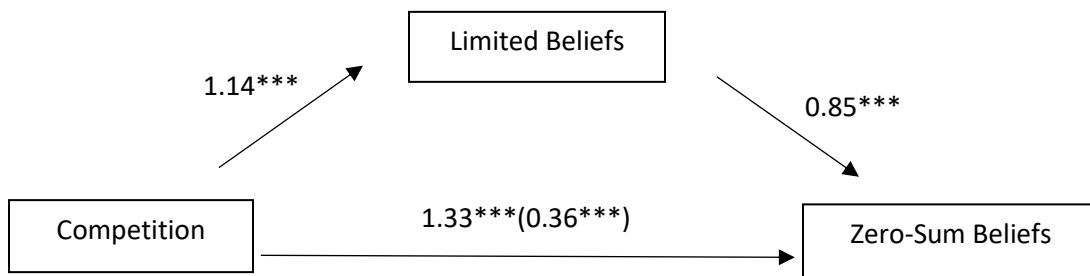


Figure 8a.

Limited Beliefs partially mediate relationship between Competition and Zero-Sum Beliefs

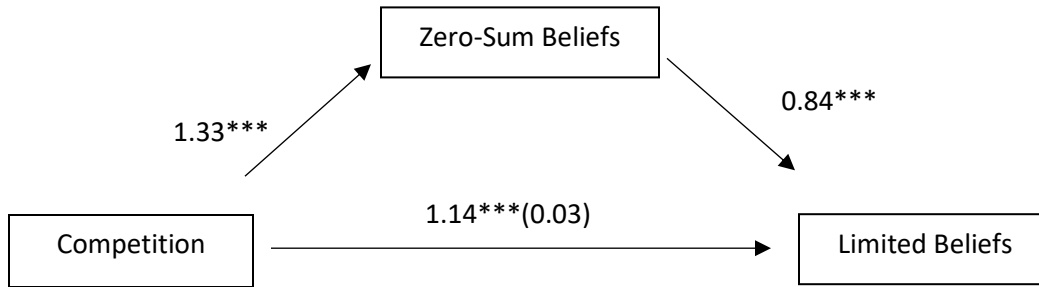


Figure 8b. Zero-Sum Beliefs fully mediate relationship between Competition and Limited Beliefs.

## Discussion

We found that individuals in the competitive work environment condition (compared to collaborative) perceived resources at Cast as being more limited. Additionally, we found that these limited beliefs partially mediated the relationship between workplace competition and zero-sum beliefs. However, we also observed that zero-sum beliefs mediated the relationship between workplace competition and limited beliefs. While it is difficult to interpret the directionality of this relationship, we can conclude that the extent to which people perceive resources, both material and symbolic, as being limited, is closely tied to the extent to which people perceive them as zero-sum. This is consistent with the findings from Study 1.2 and also with external studies on resource scarcity and zero-sum thinking (Różycka-Tran et al., 2015; Sirola & Pitesa, 2017; Ongis & Davidai, 2021). This also sheds light on the fact that workplace competition can indeed make not only jobs and salaries feel more limited, but also symbolic resources such as respect and freedom. This has important implications for organizations when they consider how they build and communicate their work environments to their employees. And finally, the connection between limited beliefs and zero-sum beliefs provides an opportunity to reduce zero-sum beliefs. If competition makes resources feel more limited, which in turn makes

resources feel more zero-sum, then perhaps we can intervene halfway by reminding people that competitive environments don't have to be resource scarce, and by doing so mitigate zero-sum thinking. This "intervention" will be tested in Chapter 3. First, though, I want to examine whether a competitive climate affects zero-sum beliefs for members of a real (rather than hypothetical) organization.

### **Study 2.5**

The studies so far in Chapter 2 asked participants to make judgments about an imaginary company Cast Technologies. We found that priming a competitive work climate leads individuals to perceive greater resource limitation and hold stronger material and symbolic zero-sum beliefs. In these studies, participants had no prior knowledge of Cast Technologies and solely based their judgments on the information we provided to them. However, in the real world, people's perceptions of their work environment are also shaped by their experiences, identification, and engagement with their organization and colleagues. In Study 2.5 we wanted to apply our methodology to a real-world sample where people make zero-sum judgments about their own organizations. In addition to testing how situationally priming a competitive environment might influence symbolic zero-sum thinking, studying a real-world sample also provided the opportunity to understand several other aspects of zero-sum thinking. Because participants came in with their own impressions of their organization, we would be able to test whether natural perceptions of competition and resource limitation predict zero-sum beliefs, particularly symbolic ones. Furthermore, studying a real organization would allow us to examine the behavioral consequences of zero-sum thinking, such as interpersonal and financial prosocial behavior.

We chose to study an organization close to home, the UChicago Booth School of Business. At Booth, we planned to collect a sample of its largest demographic: MBA students. To manipulate perceptions of competition for Booth MBA students, we created brochures using real Booth website materials that emphasized either competitive aspects or collaborative aspects of the Booth MBA program. We also planned on having participants reflect on the content in these brochures to solidify the messaging. Because the Booth MBA student community is a finite quantity, we first piloted our homemade brochures and reflection task with an online crowdsourced sample.

## **Pilot**

### **Method**

*Participants.* One hundred participants were recruited via Prolific and completed the study in exchange for a small payment (71 female, 27 male, 2 Other; Mean Age = 31.59; 68% White, 3% Black, 18% Asian, 4% Hispanic or Latino, 7% Other).

After providing consent, participants were randomly assigned to one of four between-subjects conditions (competitive, competitive reflect, collaborative, collaborative reflect). In each condition, participants were initially told that they would read a brochure advertising a university's business school MBA program. In the competitive conditions, the brochure contained language that emphasized an individual-focused and competitive culture (i.e. case competitions, individual awards, merit-based scholarships, *championing the individual*). In addition, the brochure only contained images of single individuals. In the collaborative conditions, the brochure contained language that emphasized a team-oriented and collaborative culture (student groups, community awards, mentor programs, *collaboration makes us better*). In addition, participants assigned to the reflect conditions were asked a follow-up question after the

brochure: to reflect on the brochure to describe one aspect of the business school's culture that was competitive/collaborative. Meanwhile, participants assigned to the no-reflect conditions were asked the follow-up question: to describe one aspect of the business school's culture that they noticed in the brochure.

After reading the brochures and answering the respective follow-up question, participants saw two 7-point Likert scale questions assessing 1) their perceptions of the extent to which the work environment at the Booth was competitive or collaborative and 2) their perceptions of the extent to which resources available for MBA students at the business school were limited or abundant. Next, participants read 12 statements describing a zero-sum relationship at Booth and indicated on a scale of 1-7 (Strongly disagree-Strongly agree) how much they disagreed or agreed with each statement.

*When certain students at Booth make academic gains, others lose out academically.*

*Money spent on resources for certain students at Booth means less money for resources for other students.*

*If certain students at Booth are given more respect, others may get less respect than they are used to getting.*

Following the zero-sum belief measure, participants completed an attention check question and a brief demographics questionnaire. They were then thanked for their time and compensated.

## **Results**

We conducted a one-way ANOVA to analyze the effect of brochure condition on perceptions of competitiveness. The ANOVA revealed a statistically significant difference in perceptions of competitiveness between the competitive brochure ( $M = 4.27$ ) and collaborative

brochure ( $M = 2.33$ ),  $F(1, 96) = 43.48$ ,  $p < 0.001$ . To understand how asking participants to reflect on competitive/collaborative aspects of the brochure might also shape perceptions of competitiveness, we conducted two separate one-way ANOVAs on each brochure condition with reflect condition as the independent variable. For participants who read the competitive brochure, there was a significant difference between reflect conditions, with participants who were prompted to reflect on a competitive aspect of the business school ( $M = 5.04$ ) perceiving a more competitive environment than those who were just asked to describe anything from the brochure ( $M = 3.65$ ),  $F(1,54) = 13.21$ ,  $p < 0.001$ .

Because of the results of the pilot, we decided to keep the brochures in their current state to use for the main study of MBA students. Also, due to the effectiveness of the reflection question, we incorporated this into our main study's experimental conditions as well.

## Study 2.5

### Method

*Participants.* We recruited current and recently graduated MBA students from the business school of a midwestern university. We reached these students using a variety of methods. During the summer quarter, we advertised and distributed our survey via summer course instructors, student organization and club slack posts, and snowball sampling. In addition, we also collaborated with a behavioral science research center which advertised and distributed the study via email lists and in-person pop-up labs. Altogether, we collected data from 325 participants (Mean age= 29.17, Gender: 42% Female, 55% Male, 3% Other Race: 43% White, 33% Asian, 13% Hispanic/Latino, 3 % Black, 8% Other), 175 of which took the study online, and 150 who took the study in-person via tablet/computer.

*Design and Procedure.* After providing consent, participants were randomly assigned to one of three between-subjects conditions (competitive, collaborative, control). In the competitive and collaborative conditions, participants were told that they would be reading a brochure that advertises their business school's MBA program. After reading their respective brochure, participants in the two experimental conditions also were asked to "*reflect on the brochure to describe one aspect of Booth's culture that is competitive/collaborative*". In the control condition, participants did not read either brochure and instead were asked to spend an equivalent time (compared to other conditions) reflecting on their time as an MBA student, and to describe their most memorable experience as a Booth MBA student.

Participants were then asked to judge the competitiveness of the work environment and the abundance of resources at the Booth School of Business. After these two items they completed the 12 zero-sum belief scale, measuring both material and symbolic zero-sum beliefs about the culture at Booth. Following the zero-beliefs scale, participants were given a choice to leave their contact information to help incoming students: "*Are you willing to be contacted by incoming MBA students at Booth for advice and mentoring?*"

We also measured participant's willingness to donate to Booth. This was a two-part question. First, participants read that they would have the option to donate, and then were given a list of specific Booth funds towards which they could donate: "*If you are selected to win one of the \$100 prizes for this study, you have the option of donating none, some, or all of the money to Booth. To which Booth fund/center would you be most interested in donating? If you would not like to donate, leave this question blank.*"

Second, participants were shown a 0-100 slider with which they could indicate the exact amount that they wanted to donate. After this, participants completed a demographics questionnaire, were debriefed, and thanked for their time.

## Results

*Manipulation Check.* To examine the effectiveness of the brochure manipulation, we conducted a one-way ANOVA with condition as the independent variable and perceived competitiveness as the dependent variable. We found no significant difference between conditions,  $F(2, 322) = 0.76, p = 0.48$ , indicating that participants' perceived competitiveness of the environment did not differ based on whether they received the competitive brochure ( $M = 2.74$ ), collaborative brochure ( $M = 2.57$ ), or control task ( $M = 2.57$ ).

*Zero-Sum Beliefs.* We also conducted a one-way ANOVA to assess the effect of condition on zero-sum beliefs. We found no significant difference between any of the three conditions for overall zero-sum beliefs  $F(2, 322) = 1.17, p = 0.31$ , material zero-sum beliefs, or symbolic zero-sum beliefs.

Although we found null results across experimental conditions, we were still interested in whether perceptions of competition and resource limitation would predict zero-sum beliefs in the real-world Booth MBA sample. We found a significant relationship between perceived competitiveness and zero-sum beliefs, such that individuals who viewed Booth's environment as less collaborative and more competitive were also more likely to endorse both material zero-sum belief statements ( $B = 0.18, SE = 0.05, t = 3.38, p < 0.001, 95\% CI [0.08, 0.28]$ ) and symbolic zero-sum belief statements ( $B = 0.10, SE = 0.05, z = 1.96, p = 0.05, 95\% CI [0.00, 0.20]$ ).



We found a similar trend for perceived resource limitation, with individuals who viewed resources at Booth as less abundant and more limited were also more likely to endorse zero-sum beliefs, both material ( $B = 0.26, SE = 0.06, t = 4.64, p < 0.001, 95\% CI [0.15, 0.37]$ ) and symbolic ( $B = 0.24, SE = 0.05, t = 4.40, p < 0.001, 95\% CI [0.13, 0.34]$ ). We did not find any significant two-way interactions between perceptions of competition and perceptions of resource abundance on zero-sum beliefs.

*Zero-Sum Beliefs Predict Behavior.* Another key question of the study was whether zero-sum beliefs would predict either helping behavior or donating. We observed from logistic regression models that material zero-sum beliefs did not predict helping behavior ( $B = -0.11, SE = 0.10, z = -1.06, p = 0.29, 95\% CI [-0.31, 0.09]$ ). However, there was a significant relationship between symbolic zero-sum beliefs and helping, such that those who held stronger symbolic zero-sum beliefs were less likely to leave their email to be contacted by an incoming student ( $B = -0.26, SE = 0.11, z = -2.42, p = 0.02, 95\% CI [-0.48, -0.05]$ ).

Interestingly, we saw an opposite pattern when predicting donations. Individuals who held stronger material zero-sum beliefs were less likely to donate to Booth ( $B = -4.79, SE = 1.79, z = -2.68, p = 0.01, 95\% CI [-8.31, -1.27]$ ), but there was no relationship between symbolic zero-sum thinking and donations ( $B = -2.33, SE = 1.88, z = -1.24, p = 0.22, 95\% CI [-6.02, 1.37]$ ).

## **Discussion**

In Study 2.5 our key manipulation was ineffective at changing MBA students' perceptions of competitiveness at their own institution, the UChicago Booth School of Business. In addition, we also did not see differences between conditions for zero-sum beliefs. Given that the brochures did make a difference for an online sample of Prolific workers, the null results in

our main sample suggest that it is more difficult to influence peoples' views of their own organizations. Our online sample had no prior knowledge of Booth and were able to base their judgments on the information from the brochure. However, real Booth MBA students have had their own experiences with Booth culture that have shaped more stable views of their institution. The results of the current study show that in future work, stronger manipulations of competition may be needed to influence people's views of their own organizations. Such manipulations may include repeated instances of reading about competition, experiencing competition firsthand, or influencing individual views with group norms (e.g., others are seeing things as more competitive).

However, we were still able to extract insights from other analyses. We found that both perceptions of competition and resource limitation predicted zero-sum thinking, both material and symbolic. This finding is consistent with the results from our previous studies and provides further evidence suggesting that symbolic zero-sum beliefs are driven by perceptions of competition from others over limited resources.

We also observed that symbolic zero-sum beliefs predicted helping behavior while material zero-sum beliefs did not. Booth MBA students who naturally saw symbolic resources as more zero-sum were less likely to leave their email to be contacted by incoming students for advice and mentoring. This finding is consistent with previous research on the link between zero-sum thinking and behaviors that aim to reduce gains for others (Wilkins et al., 2015; Kuchynka et al., 2018; Sirola & Pitesa, 2017; Chernyak-Hai & Davidai, 2022). Furthermore, our results highlight the unique role of symbolic zero-sum beliefs in influencing behavior in the domain of social outcomes. We also found that material zero-sum beliefs predicted a monetary behavior (donations), while symbolic zero-sum beliefs did not. Taken together, these findings suggest that

while material zero-sum beliefs may lead to behaviors that prevent others from gaining material resources (e.g., opposing affirmative action), symbolic zero-sum beliefs may instead lead to behaviors that prevent others from gaining symbolic resources. For example, an individual who sees respect as zero-sum may be less motivated to help others make social connections, succeed, and gain respect themselves. In this manner, individuals who see symbolic resources as zero-sum may actually perpetuate symbolic inequalities in the same manner that we see in previous work on zero-sum beliefs.

### **General Discussion**

Across five studies, we had participants read about work environments that were described as either being competitive or collaborative. When individuals viewed the organization's culture as being more competitive, they showed greater endorsement of both material and symbolic zero-sum beliefs. These findings are consistent with the broader literature showing the key role of perceived competition in zero-sum thinking and related constructs such as envy (Ghadi, 2018; Zurriaga et al., 2020). Importantly, many previous studies in this domain manipulated a specific driver of zero-sum thinking. For instance, participants read about gains for a minority outgroup (Wilkins et al., 2015), read about symbolic threat to ingroup values (Wilkins et al., 2021), read about economic downturn (Sirola & Pitesa, 2017), imagined exclusive (compared to open) romantic relationships (Burleigh et al., 2016), or were made to feel relatively disadvantaged (Ongis & Davidai, 2021). The results from Chapter 2 build upon these previous studies to also show that broader perceptions of competition in one's environment also contribute to the belief that gains for one lead to losses for another.

Furthermore, our manipulation of competition increased symbolic zero-sum thinking without having to mention any symbolic resources. While we do not have evidence to claim that

this is or is not an error, it does suggest in situations where a zero-sum construal is made more salient (competition), people may apply this heuristic (Meegan, 2010) to resources that might, at the very least, be ambiguous in terms of how zero-sum they are. This calls into question the extent to which individuals overgeneralize zero-sum views more broadly. For example, when reading about economic downturn (Sirola & Pitesa, 2017), will symbolic resources also feel more zero-sum? And when reading about symbolic threat to religious values (Wilkins et al., 2021), will Christians see economic gains for LGBTQ groups as taking away from their own economic gains? These questions are an exciting area for future research.

We also found that the extent to which individuals see symbolic resources as being zero-sum is closely tied to their perceptions of how limited those symbolic resources are. Although respect, freedom, or cultural values may intuitively be difficult to quantify, our studies (alongside studies from Chapter 1) show that perceiving competition between coworkers can lead to the inference that there is a finite amount of respect for everyone. While we were not able to definitively establish the role of limited beliefs in explaining zero-sum beliefs, we are able to suggest that workplace competition makes symbolic resources feel more limited and more zero-sum. The fact that symbolic resources feel more limited in competitive environments demonstrates that even symbolic resources can be seen as finite. This provides insight for understanding the causes of zero-sum beliefs, particularly for concepts and resources that are intangible. As social psychologists have uncovered more about the various contexts and group identities that shape zero-sum beliefs of abstract resources (e.g., success, discrimination), it has been proposed that competitive contexts can promote an image of success as a limited good (Foster, 1965; Sirola & Pitesa, 2017). Our studies provide support for this explanation by

demonstrating the link between limited beliefs and zero-sum beliefs even for resources that may normatively be seen as being unlimited in an absolute sense.

And finally, a more general theoretical contribution of our work is to highlight the impact of organizational messaging and culture on how individual employees perceive resources and relationships in the workplace. Compared to other workplace individual-level attitudes and behaviors, zero-sum thinking is a phenomenon that is relatively under-researched. Over the past two decades, social and cognitive psychologists have demonstrated the prevalence of zero-sum thinking and the many contexts and identities that lead individuals to see certain situations and relationships as zero-sum (Norton & Sommers, 2011; Esses et al., 2001; Kehn & Ruthig, 2013; Wilkins et al., 2015; Davidai & Ongis, 2019; Johnson et al., 2022; Kuchynka et al., 2018; Meegan, 2010). Many of these drivers of zero-sum thinking are endemic to the workplace where hierarchies define roles, profit and efficiency define business strategy, and individual contributions determine who gets recognized and rewarded. Our results suggest that these kinds of competitive work environments, which may be intentionally or unintentionally created by the ways in which organizations communicate and build their employee culture, may be causing workers to feel not only that promotions are zero-sum, but that respect at work is zero-sum as well. We demonstrate one adverse consequence of symbolic zero-sum thinking: reduced help for one's peers. And there is good reason to believe that zero-sum views in the workplace may drive both competitive and cooperative workplace behaviors in many other ways (Sirola & Pitesa, 2017; Chernyak-Hai & Davidai, 2022; Kuchynka et al., 2019). Future work is needed to further unpack the complexity of organizational zero-sum thinking.

### **Chapter 3: Resource Abundance: Mitigating competitive zero-sum beliefs**

The studies in Chapter 2 explore the psychology of symbolic beliefs in the workplace. One key finding from Chapter 2 is that both symbolic and material zero-sum beliefs are closely tied to beliefs about resource limitation. When resources feel limited, it seems that resources also feel zero-sum. In Chapter 3 we wanted to examine whether changing beliefs about resource limitation might be effective in reducing zero-sum beliefs. There are very few studies that directly test interventions or strategies for mitigating zero-sum beliefs. One potential way to reduce zero-sum thinking is to simply remind people that a given situation is not zero-sum. For example, college students often assume, sometimes erroneously, that grades are zero-sum, and when presented with information that 19 students have generally gotten high grades, will predict a lower grade for the 20<sup>th</sup> student. However, when also reminded that instructors do not use predetermined grade distributions, that there is not a limited amount number of As, and that grades are determined instead by how the quality of work compares to a predetermined standard of quality, this zero-sum bias on grades is reduced (Meegan, 2010). In another example, appealing to values of acceptance mitigates zero-sum views of sexual minorities. In this paper, it was shown that Christians, compared to other groups, are more likely to view LGBTQ individuals as being in a zero-sum relationship with Christians, where gains for LGBTQ groups leads to losses for Christians. Additionally, priming religious values and symbolic threat both exacerbated zero-sum beliefs from Christians. However, presenting mainline Christians with a Bible verse that emphasized acceptance of others was effective at reducing their zero-sum views on LGBTQ vs. Christian relations (Wilkins et al., 2021). These two studies reveal that zero-sum beliefs can be reduced through simple interventions that either directly target zero-sum beliefs, or adjacent beliefs (e.g., acceptance) that may indirectly reduce zero-sum thinking.

In Chapter 3, we propose another strategy for intervening on zero-sum beliefs: resource abundance. Both the literature review and empirical results from this dissertation indicate that beliefs about resource limitation are closely tied to zero-sum beliefs. Therefore, it may be possible to shift zero-sum beliefs by making resources feel more abundant. Importantly, we aim to test whether this reduction may occur even in competitive environments where zero-sum beliefs are already increased. This is novel compared to previous studies that only intervened to reduce zero-sum beliefs but did not show whether this would buffer against another variable that simultaneously increased zero-sum beliefs. We feel that this is an important aspect to include because many workplaces are competitive by nature, and in many instances, competition can have positive benefits both for the individual and their organizations. Therefore, to create as realistic of a test as possible, we investigate whether priming resource abundance beliefs can reduce the effect that competition has on raising both material and symbolic zero-sum beliefs. The answer to this question has both theoretical and applied significance. It would improve understanding of the psychological determinants of zero-sum thinking, as well as provide organizations and practitioners a real strategy for intervening and reducing zero-sum thinking and competitive behavior in the workplace.

### **Study 3.1**

The goal of Study 3.1 was to test the hypothesis that priming resource abundance would reduce zero-sum beliefs in competitive work environments. To do this, we created an abundance manipulation to be presented alongside our competition manipulation from the previous studies in Chapter 2. We expected that when participants were told that resources at Cast Technologies were abundant, they would report lower endorsement of zero-sum beliefs for both material and symbolic resources.

## Method

*Participants.* We collected data from 1199 participants via Prolific. Of these participants, 119 were excluded from analyses due to failed attention and comprehension checks, leaving a final sample of 1080 (522 female, 534 male, 24 Other; Mean Age = 32.71; 68% White, 8% Black, 9% Asian, 5% Hispanic or Latino, 10% Other).

In study 3.1, participants again were randomly assigned to either read about a competitive Cast company or a collaborative Cast company. However, this time they were also randomly assigned to one of two resource conditions: abundant or control. This resulted in a 2x2 (competitive/collaborative x abundant/control) design. Participants in the abundant condition saw an additional paragraph describing the abundance of resources for employees at Cast, such as salaries, bonuses, workplace trainings, networking opportunities, etc. Participants in the control condition did not receive this extra information. Following the manipulation, all participants completed the zero-sum beliefs scale and answered two manipulation checks, one measuring perceptions of competition, and the other perceptions of resource abundance.

Abundant passage:

*“Cast’s competitive/collaborative mindset has helped the company see consistent growth each year. Due to this success, Cast has been able to provide an abundance of opportunities and resources for its employees. Employees at Cast enjoy some of the most competitive salaries, bonuses, and benefits within the tech industry. Cast also has returned its financial success back to its employees in the form of professional development by providing monthly workshops, training sessions, and networking opportunities. Cast values its employees and makes every effort to ensure that when it comes to financial and professional opportunities, there is plenty for everyone.”*

## Results

*Manipulation Checks.* Similar to previous studies, participants in the competitive conditions ( $M = 5.62$ ) rated Cast Technologies as being more competitive than the collaborative conditions ( $M = 2.56$ ),  $F(1, 1078) = 1381$ ,  $p < 0.001$ . Additionally, participants in the abundant



conditions ( $M = 5.20$ ) rated resources at Cast Technologies as being more abundant than those who read the control conditions ( $M = 4.66$ ),  $F(1, 1078) = 51.7, p < 0.001$ .

We again saw a main effect of competition on zero-sum beliefs, where participants in the competitive conditions ( $M = 3.98$ ) endorsed zero-sum beliefs more than those in the collaborative conditions ( $M = 3.03$ ),  $F(1, 1078) = 160.10, p < 0.001$ . We also observed a main effect of abundance, such that participants in the abundant condition ( $M = 3.35$ ) endorsed zero-sum beliefs less than those in the control conditions ( $M = 3.63$ ),  $F(1, 1078) = 12.11, p < 0.001$ . There was no significant two-way interaction between competition and abundance,  $F(1, 1076) = 1.16, p = 0.28$ . We were also interested to see whether this effect persisted when looking at the competitive and collaborative conditions separately. In the competitive condition, we again found a significant effect of abundance,  $F(1, 521) = 8.36, p < 0.01$ . However, we did not find a significant difference between abundance conditions within the collaborative condition,  $F(1, 555) = 1.81, p = 0.18$ . This pattern of results was similar when examining the material and symbolic zero-sum belief subscales individually.

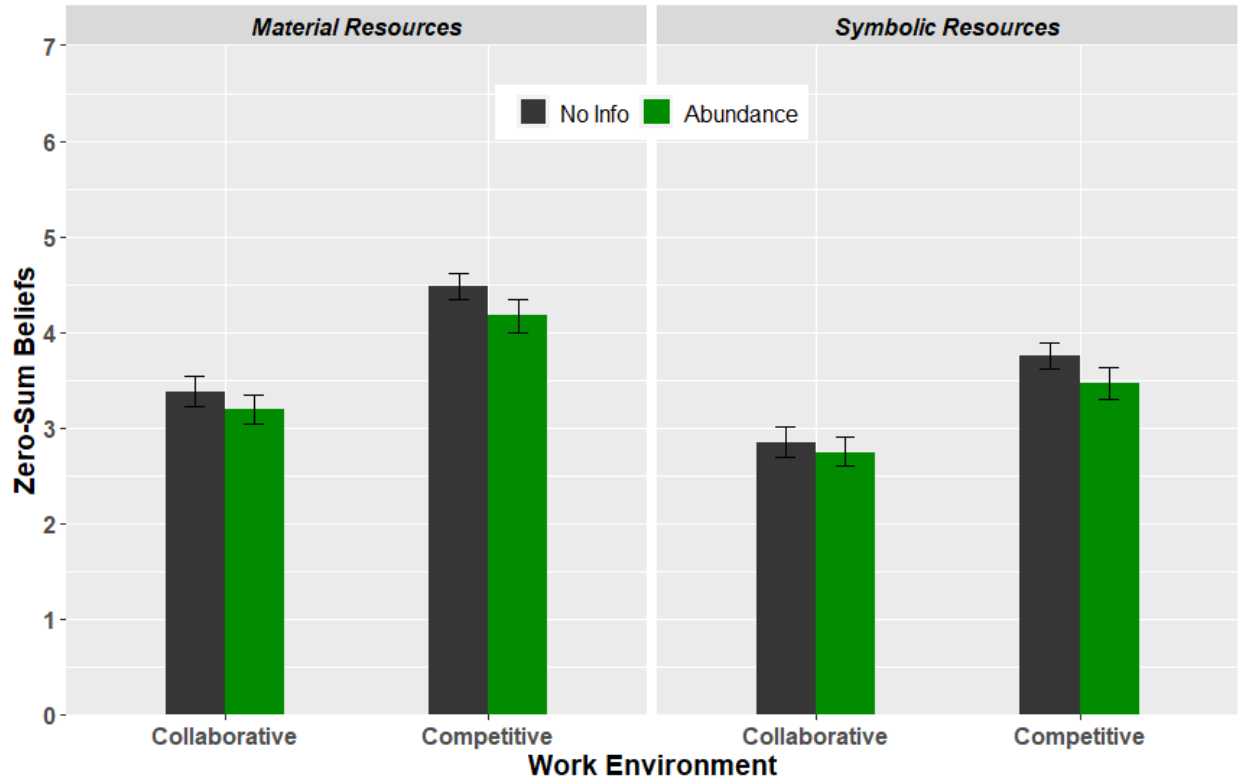


Figure 9. Zero-Sum Beliefs by work environment x abundance. Participants who read about abundance showed reduced zero-sum beliefs.

## Discussion

When presented with information that resources at Cast are abundant, participants showed lower endorsement of both material and symbolic zero-sum beliefs. This finding is consistent with theorizing that argues for resource scarcity beliefs as a key driver of zero-sum thinking (Bazerman, 1983; Baron & Kemp, 1983; Esses et al., 2001; Burleigh et al., 2016; Meegan, 2010). Furthermore, this is one of the first studies, to our knowledge, that implements this psychological mechanism to identify a strategy for reducing zero-sum thinking. By doing this, we provide additional evidence for the aforementioned link between scarcity and zero-sum thinking, and more importantly highlight a real-world intervention that can be used to mitigate zero-sum beliefs, especially when they lead to adverse outcomes. By still including our work

environment conditions, we are also able to show that priming resource abundance is effective even in competitive contexts (that may naturally make resources feel more limited). We believe this to be of particular importance because many workplaces are inherently competitive, and competition is not something that most organizations can or want to remove. Therefore, by showing the effectiveness of a simple intervention that is possible for all organizations to execute (not all organizations are well-resourced, but all can frame situations as being abundant), we place a strong value on resource abundance as a mitigating buffer against workplace zero-sum thinking.

### **Study 3.2**

The results of Study 3.1 demonstrate that just a few extra sentences about resource abundance can lead to reduced zero-sum thinking in competitive work environments. Importantly, we saw this pattern of results for both material and symbolic resources. To follow up, we wanted to add an experiential component to our abundance manipulation to see if this zero-sum belief reduction effect would be even stronger when participants felt more invested and engaged in Cast Technologies. Furthermore, we wanted to test a theoretical complement to our abundance hypothesis: that perceptions of resources being limited would enhance zero-sum thinking. To address both goals, we replaced the control condition from Study 3.1 with a limited resource condition and created an experiential office furniture budget task that varied based on these conditions.

#### **Method**

*Participants.* We collected data from 1204 participants via Prolific. Of these participants, 112 were excluded from analyses due to failed attention and comprehension checks, leaving a

final sample of 1091 (517 female, 537 male, 37 Other; Mean Age = 35.56; 69% White, 10% Black, 6% Asian, 4% Hispanic or Latino, 11% Other).
















*Design and Procedure.* The text portions of Study 3.2 were identical of that to Study 3.1. The key addition to the current design was the introduction of the office furniture budget task. In this task, participants were told that they would be completing a typical employee onboarding task to get a sense of what it might be like to be a new employee. Participants were then told that they would be furnishing their own office with a set budget, and that they would need 5 types of items to complete their office (personal chair, desk, computer monitor, guest seating, storage space). On the same page, participants were presented with their options for each of these items. For each type of item, they were given 3 choices of quality: Basic, Standard and Executive. Participants were shown two charts, one with the price of each tier of item, and another with pictures of each item. After this, participants completed two comprehension check questions to ensure that they understood how the pricing and item selection worked. On the final page of this task, participants were told their budget amount: \$1500 for the abundant condition, \$400 for the limited condition. They were then shown the charts of prices and item pictures again for reference and chose one of each type of item, all while being restricted to their given budget. The budget amount of \$1500 was chosen for the abundant condition as it would allow participants to select every executive item. Meanwhile, a budget of \$400 in the limited condition meant that participants would have to select mostly basic items and could choose only one or two standard items.

As a new employee at Cast, you will be given a set budget for furnishing your office and you can choose how you would like to spend that money. Your office should contain each of the five following items:

- Your personal chair
- Desk
- Computer Monitor
- Seating for guests
- Storage space

There is a basic, standard, and executive option for each item. Basic is the cheapest option, standard is the mid-range option, and executive is the most expensive option for each.

Take a moment to review the prices (in dollars) and images below. You do not need to memorize this, it will be shown again on later pages.

	Chair	Desk	Monitor	Guest seating	Storage Space
Basic			 19"		
Standard			 24"		
Executive			 43" Curved		

	Chair	Desk	Monitor	Guest seating	Storage Space
Basic	50	100	100	50	50
Standard	100	200	200	100	100
Executive	200	300	500	200	200

**BUDGET: 1500**

Chair	<input type="text" value="0"/>
Desk	<input type="text" value="0"/>
Monitor	<input type="text" value="0"/>
Guest Seating	<input type="text" value="0"/>
Storage	<input type="text" value="0"/>
Unused Funds	<input type="text" value="0"/>
<b>Total</b>	<input type="text" value="0"/>

Figure 10. Office Furniture Budget Task materials

Following the office furniture budget task, all participants were asked to rate the competitiveness of Cast’s work environment and the abundance or resources for employees at Cast. After this, participants rated their endorsement of material and symbolic zero-sum beliefs, completed a demographics questionnaire, and then were thanked for their time and compensated.

## Results

*Manipulation Checks.* Participants in the competitive conditions ( $M = 5.46$ ) rated the competitiveness of Cast higher than their counterparts in the collaborative conditions ( $M = 2.51$ ),  $F(1, 1089) = 1033, p < 0.001$ . Additionally, participants who received the abundant budget of

\$1500 to select office furniture ( $M = 1.97$ ) believed that resources were less limited than those who received the limited budget of \$400 ( $M = 5.11$ ),  $F(1, 1089) = 1564, p < 0.001$ .

We conducted a two-way ANOVA to examine a possible interaction of competition and abundance on zero-sum beliefs. We observed main effects of both work environment condition and abundance on zero-sum beliefs. Participants who read about a competitive ( $M = 4.09$ ) Cast Technologies endorsed zero-sum beliefs more than those who read about a collaborative Cast ( $M = 3.26$ ),  $F(1, 1087) = 130.47, p < 0.001$ . Participants who completed the abundant furniture budget task ( $M = 3.41$ ) perceived resources at Cast to be less zero-sum than participants who completed the limited task ( $M = 4.00$ ),  $F(1, 1087) = 54.96, p < 0.001$ . The same patterns of results were found when looking at both the material and symbolic zero-sum belief scales individually. We did not find a significant two-way interaction between competition and abundance for zero-sum beliefs,  $F(1, 1087) = 0.87, p = 0.35$ . As we did in Study 3.1, we tested whether the gap between abundance and limitation conditions would be significant for both competitive and collaborative work climates. In the competitive condition, we found a significant difference between abundance and limitation,  $F(1, 569) = 36.52, p < 0.001$ . In the collaborative condition, we also found a significant difference between abundance and limitation,  $F(1, 519) = 19.72, p < 0.001$ .

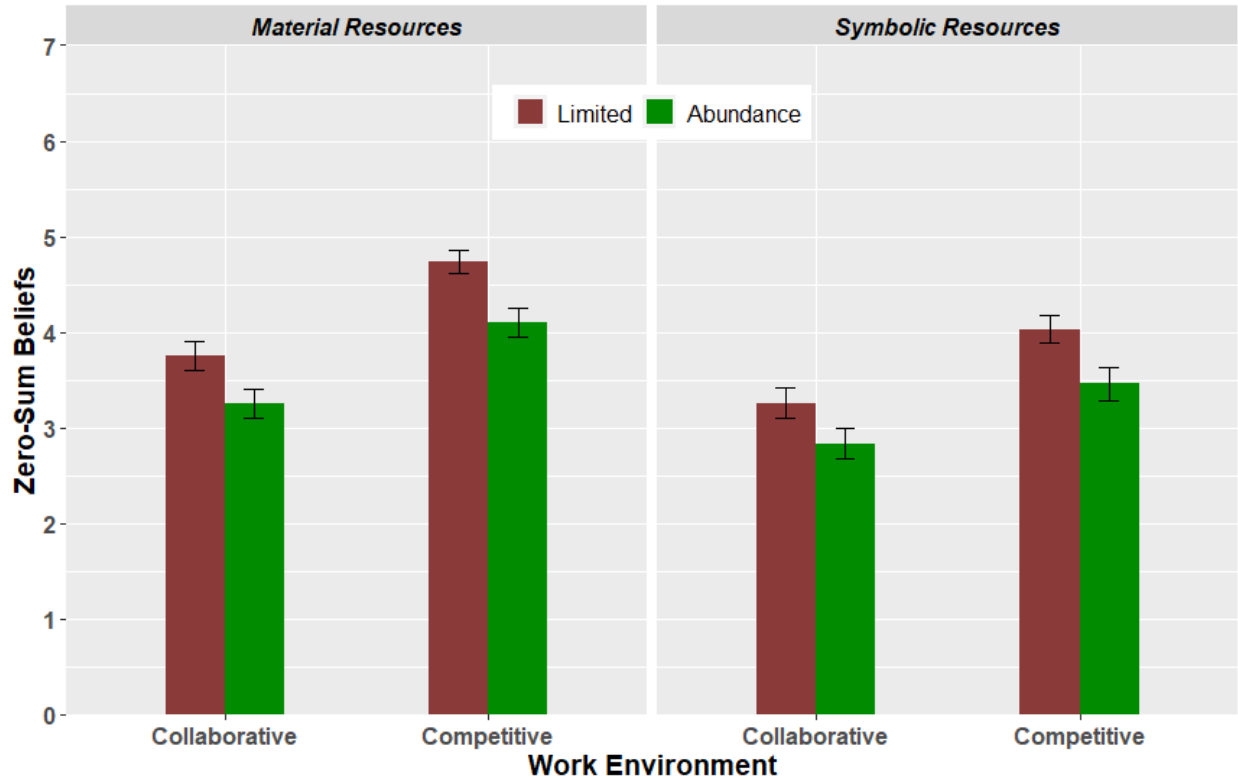


Figure 11. Zero-Sum beliefs by work environment x resource abundance. Participants who read about resource limitation showed greater zero-sum beliefs than those who read about abundance.

Although Studies 3.1 and 3.2 relied on separate participant samples, for exploratory purposes we combined the data together to understand whether experiencing resource abundance would be more effective at reducing zero-sum beliefs than just reading about it. We then conducted a one-way ANOVA to assess the role of abundance in just the competitive work environment condition. We found a significant effect of abundance condition,  $F(3, 2167) = 27.21, p < 0.001$ . Follow-up  $t$  tests revealed that there was no difference between reading about abundance ( $M = 3.82$ ) and experiencing abundance ( $M = 3.78$ ),  $t(511) = 0.37, p = 0.71$ . However, participants who experienced abundance still showed reduced zero-sum thinking compared to the control condition ( $M = 4.12$ ),  $t(540) = -3.38, p < 0.001$ . And finally, participants

who experienced resource limitation ( $M = 4.38$ ) showed greater zero-sum beliefs compared to the control condition,  $t(570) = 2.76, p < 0.01$ .

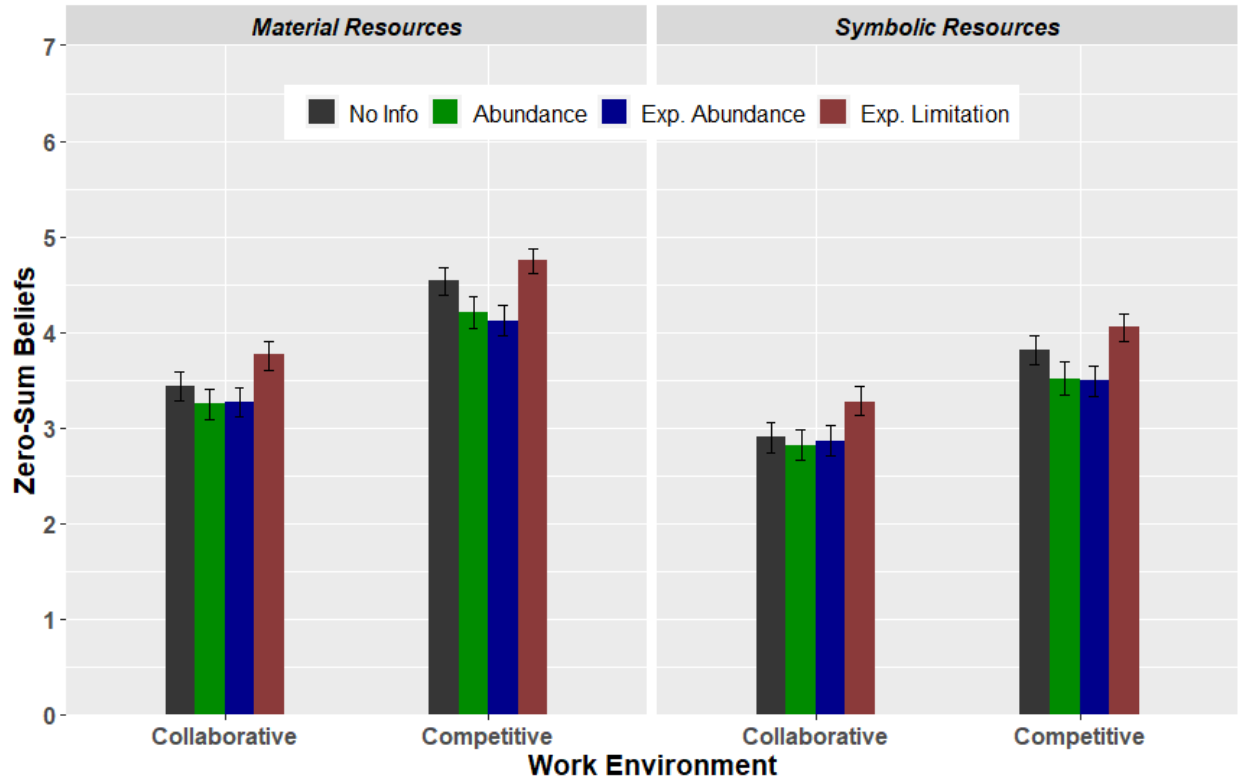


Figure 12. Combined data between Studies 3.1 and 3.2

## Discussion

In Study 3.2 we found that people who experience resource limitation perceive both material and symbolic resources to be more zero-sum than those who experience resource abundance. This finding is significant because it highlights the impact of each individual employees' own experience on how they view their workplace. Those who experience resource limitation, whether intentionally or just by chance, end up holding greater zero-sum beliefs. As shown in Chapter 2 and in the broader literature, these greater zero-sum beliefs may lead outcomes that impede cooperation (Sirola & Pitesa, 2017; Chernyak-Hai & Davidai, 2022). It is therefore vital for organizations to understand, identify, and optimize the experiences they provide for their employees in order to avoid unnecessary and harmful zero-sum thinking.



## General Discussion

In Chapter 3, we presented participants with competitive and collaborative versions of Cast, but also told some employees that resources at Cast were either abundant, or limited. We also had some participants experience abundance or limitation directly by providing a budget for selecting office furniture. Overall, reading about abundance or experiencing abundance were both effective at reducing zero-sum beliefs in competitive environments. In terms of theoretical contribution, our results provide a demonstration of how to intervene to reduce (or increase) zero-sum thinking in competitive climates. Furthermore, the design of our studies allowed us to establish the causal role of resource limitation beliefs on zero-sum beliefs, a link that we first explored in Study 2.4. These findings are consistent with previous research that has connected scarcity beliefs to zero-sum beliefs (as resources become more scarce, zero-sum beliefs increase) (Sirola & Pitesa, 2017; Ongis & Davidai, 2021; Rózycka-Tran et al., 2015). However, we further this understanding by investigating this relationship in both directions, showing that perceived resource limitation increases zero-sum beliefs while perceived resource abundance reduces zero-sum beliefs.

It is also important to note that our manipulations of abundance, both written and experiential, focused on the abundance of material resources (e.g., salaries, bonuses, workshops). Similarly, the office furniture budget task was purely financial, where participants either received a lot of money to purchase furniture, or very little money. Nowhere in these passages did we mention symbolic resources. However, we still found that material resource abundance reduced symbolic zero-sum beliefs, and that material resource limitation increased symbolic zero-sum beliefs. This suggests that when people make judgments about the availability of resources in their environment, they may overgeneralize, such that seeing evidence that certain resources are

abundant (or limited) makes all resources, even those that need not be limited, feel more abundant (or limited). It has been argued that people apply a zero-sum heuristic or zero-sum construal to situations, most often when they are competitive, and our results support such a hypothesis (Meegan, 2010; Sirola & Pitesa, 2017).

The studies in Chapter 3 have applied implications for practitioners as well. Competition is pervasive in the modern workplace. Fostering a competitive work environment has many benefits for both business and social outcomes. However, as has been shown in Chapter 2, competitive work climates also lead to greater zero-sum beliefs at the individual level. Not only do jobs, promotions, and salaries feel more zero-sum, but symbolic resources also increasingly feel as if gains for one lead to losses for another. This symbolic zero-sum thinking can have nefarious consequences for how employees treat one another, and the outcomes of this are still not well understood. However, the results of Studies 3.1 and 3.2 provide real examples of strategies that organizations can take to intervene on zero-sum thinking and mitigate it even within competitive environments. We recommend that organizations be careful and intentional about how they describe their work environments, and the experiences that they provide for their employees. Our findings show that even a few sentences, or a mundane onboarding task, can influence zero-sum beliefs for a wide range of resources. One example where we believe our research holds potential value is within diversity, equity, and inclusion buy-in within companies. Recent work has revealed that members from high-status groups (Whites) do not react well to diversity, expecting more unfair treatment and more discrimination at a company that values (vs. does not mention) diversity. We propose that these feelings may be driven by zero-sum beliefs about gains for minorities taking away from opportunities for Whites. If this is the case, our research shows that reminding all employees of the abundance of resources at a company, that

there is enough for everyone, could be effective at reassuring Whites that they are not going to lose out due to diversity. Overall, more research and testing is necessary to optimize these interventions, but our studies provide one of the first demonstrations for how to reduce zero-sum beliefs at work.

## **Conclusion**

Many situations in life are viewed as zero-sum. More pizza for me means less pizza for you. Sports are always decided by who wins and who loses. Every year, high school seniors compete for a limited number of spots at colleges and universities. However, there are also many cases where it is not as clear that things should work this way. For example, does the respect that one person gets take away from someone else's respect? In this dissertation, I explored this question and attempted to understand the psychology of symbolic zero-sum thinking. In Chapter 1, I demonstrated the basic zero-sum beliefs have for symbolic resources and showed that renewability can shift zero-sum beliefs both positively and negatively. In Chapter 2, I examined how workplace competition leads to material and symbolic zero-sum beliefs, found support that these beliefs are closely associated with perceptions of resource limitations, and also observed the behavioral consequences of zero-sum beliefs within a real organization. And in Chapter 3, I created and tested interventions for mitigating zero-sum thinking within organizations and found that reminding employees about abundant resources was effective at reducing zero-sum beliefs. In contrast, having employees experience resource limitation exacerbated the effect of competition increasing zero-sum beliefs. Altogether, I hope that my research sheds light on how people think about symbolic resources, what situations make symbolic resources feel more zero-sum, and what we can do to create environments where people do not feel that they stand to lose when others gain.

### **Limitations and Future Directions**

While this dissertation provides insight regarding the psychology of symbolic zero-sum beliefs, there are aspects of the research that limit the conclusions that can be drawn more

broadly. First, many of the studies were done using online samples, where participants were asked to imagine hypothetical scenarios of resource distribution or workplaces. The types of beliefs and behaviors we see in these samples may not be reflective of how people think about resources in the real world. For example, Study 2.5 collected a sample of MBA students and could not shift their zero-sum beliefs about their MBA program in the same way as an online sample. Although our research certainly sheds light on many of the mechanisms and theory behind zero-sum thinking, more work needs to be done, especially in real-world contexts, to fully understand these ideas.

Another limitation of the current work concerns the materials and stimuli used in the experimental manipulations. It is possible that the null results of studies 2.3 and 2.5 were due to weak manipulations where our materials were not effective enough at creating differences in perspective or perceived competition. This is an unfortunate reality of research, but future work with more robust manipulations may be able to provide deeper insight into some of our questions that remain unanswered.

A key focus of this dissertation was to investigate how certain contexts (e.g., renewability, competition, resource limitation) led to symbolic resources feeling more zero-sum. However, our data was not able to speak to whether this was an accurate or inaccurate shift. For example, it may very well be that in competitive work climates, respect is more zero-sum. How might one address this? One idea could be to study how respect is actually divided in group contexts. Have people rate, in both competitive and noncompetitive environments, how much they respect each other person. By doing so, one could determine whether respect does become more limited. By doing this, the extent to which symbolic zero-sum beliefs are a bias or heuristic (Meegan, 2010) can be better understood.

One potentially key determinant of symbolic zero-sum beliefs that I did not explore is group identity. As shown in previous research, group identity has powerful consequences on whether people perceive group hierarchies to be zero-sum (Norton & Sommers, 2011; Kehn & Ruthig, 2013; Wilkins et al., 2015; Kuchynka et al., 2018; Wilkins et al., 2022). I suspect that group identity plays a similar role in symbolic zero-sum thinking. For example, men may be more likely than women to believe that respect for women takes away from respect for men. To better understand symbolic zero-sum beliefs, research needs to explore this question. Furthermore, it would be interesting to also see whether this depends on framing the question within the context of groups (respect for women takes away from respect for men) versus individuals (respect for a female employee takes away respect from her male coworker).

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