

# Structural balance across the strait: A behavioral experiment on the transitions of positive and negative intergroup relationships in mainland China and Taiwan

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## ABSTRACT

Structural balance theory explains how ties are formed in signed networks. A balanced triad, however, could be incidentally caused by balance-unrelated mechanisms. Teasing apart the multiple mechanisms that lead to balanced networks helps clarify the explanatory power of a theory. In a behavioral experiment, we investigated the transition of intergroup relations across the positive/negative boundary. Voluntary participants, recruited from mainland China and Taiwan, were placed in triadic networks, each facing two alters. We manipulated the attributes and relationships of the alters to examine how people adjust their relationships. Our experiment shows that people are more likely to change from behaving negatively to positively to an alter when they know the alter is negatively treated by the other alter. Conversely, people are more likely to change from behaving positively to negatively to an alter when they know the alter negatively treats the other alter. Beyond these effects, people are more likely to turn from positive to negative and vice versa to an alter when doing so achieves structural balance in a triad. Our study provides new experimental evidence for the structural balance theory in predicting the formation of signed networks when other conflating mechanisms are controlled for.

## 1. Introduction

Interpersonal relationships can be characterized by whether they are positive or negative. Positive relationships are mutually beneficial; people in such relationships work to increase the benefits to the other through such actions as caring, making commitments, and sacrificing. Negative relationships, in contrast, are hostile and vengeful in nature, and people in such relationships act to decrease the welfare of the other by such actions as defaming and assaulting. Interpersonal relationships, however, can turn from positive to negative or vice versa from time to time. Such a transition could occur because of the influence of a third party, for example, when a married couple quarrels over their misbehaving child. This suggests that interpersonal relationships, which are seemingly dyadic on the surface, are subject to the influence of relationships embedded in larger triadic networks.

The paper touches on the following fundamental questions of social network research: What sets the boundary between positive and negative relationships? What makes a relationship turn from positive to negative, or vice versa? To be more specific, how might third party influence the transition of positive and negative relationships between

two persons?

While these questions have spurred tremendous interests in the signed networks in social network research (Doreian and Krackhardt, 2001; Deng and Abell, 2010; Huitsing et al., 2012; Everett and Borgatti, 2014), and structural balance theory, an iconic theory in the literature (Heider, 1946; Cartwright and Harary, 1956), provides an elegant explanation to the puzzle, empirical supports for the theory remain mixed up to date (White, 1977; Doreian and Krackhardt, 2001; Maoz, 2009; Leskovec et al., 2010; Szell et al., 2010; Ilany et al., 2013; Yap and Harrigan, 2015; Lerner, 2016; Rawlings and Friedkin, 2017). One issue is that people may adjust positive or negative relationships for various reasons, of which attaining a triadic balance is one. The challenge is that different mechanisms that govern the formation of positive and negative relationships may conflate each other at the behavioral level, such that counts of balanced triads in social networks cannot really determine whether the pursuit of structural balance is the only intention that underlies people's decisions in adjusting their relationships. As multiple mechanisms can involve in the formation of social networks and lead to identical or similar network patterns, it is important that we carefully tell them apart in research to have a clearer understanding of

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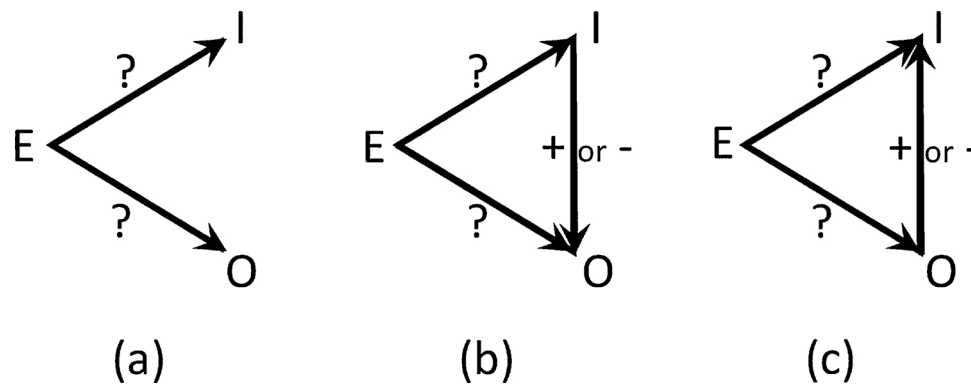


Fig. 1. Illustrations of intergroup and intragroup relationships in dyadic and triadic contexts. “E” represents ego; “I” ingroup (same nationality), and “O” outgroup (different nationality).

what motivate people to maintain and adapt their social networks.

Our paper makes a contribution to addressing this issue, using an experimental approach (Willer and Walker, 2007). One advantage of the experimental method is having full control of the treatment variables. The autonomy of the experimental design enabled us to test varying triadic networks and thus to tease out one mechanism from another in how they influence people in adapting their relationships in a triad. Moreover, the experimentation method is handy for creating network dynamics in the study, allowing us to test how the formation of one tie *causally* influences the adaptation of extant ties in the network. These advantages can facilitate a more rigorous examination of the net effect of one theory, such as structural balance theory, while controlling for other competing mechanisms in research.

We conducted a behavioral experiment on the relationship between mainland Chinese and Taiwanese—conventionally known as the cross-strait relationship—to investigate how intra- and inter-group relationships adapt. The two societies have experienced growing ethno-centrality among youth over the past decade (Mozur, 2016; Hernandez, 2017). National identity and political ideology are a source that nourishes ingroup love and outgroup hate. The cross-strait relationship serves as a suitable case to test not only how positive and negative relationships are formed, but also how they adapt under the influence of a third party.

We designed an incentivized experiment in which people earned credits to receive an economic bonus that we provided. A total of 275 college students were recruited from two iconic universities respectively in mainland China ( $N = 143$ ) and Taiwan ( $N = 132$ ) to our study. Each participant initially had an equal probability of receiving the bonus. In the experiment, participants decided whether to incur a cost to increase or decrease the probability of others receiving the gift. A person’s costly decision to change the probability of others earning the bonus is an indicator of how s/he views the relationship—positively or negatively—with an ingroup or outgroup alter.

We investigated how an individual’s relationship with an alter changes when placed in varying triadic contexts. Each participant made two independent decisions, respectively, of whether to favor or disfavor two alters of a certain background—the dyadic context. Later, they made new decisions to the two alters of the same background after receiving information about how one alter treated the other—the triadic context. We are interested in under what circumstances a relationship would turn from positive to negative, or vice versa, when it is assessed triadically rather than dyadically.

## 2. Theoretical motivations and hypotheses

Intergroup relation is one of the examples that feature a sharp contrast of positive and negative relationships (Messick and Mackie, 1989; Pettigrew, 2016). One of the most well-established research

findings about intergroup relationship is ingroup favoritism—our propensity to show more favor to ingroup than outgroup persons (Hewstone et al., 2002). Ingroup favoritism encompasses the following conditions: ingroup love, outgroup hate, and both. If we refer to (dis) favoritism as a (negative) positive relationship, then ingroup love means that a person places the position of an ingroup alter on the positive side and that of an outgroup alter at the neutral point. Outgroup hate, in contrast, means that the position of an outgroup alter falls in the negative segment, while that of an ingroup alter is set on the neutral point. Although ingroup favoritism is rooted in social behaviors, they are not at all unadaptable. For example, outgroup hostility can be mitigated when seeing an outgroup person deliver help to our ingroup fellows (Chiang and Wu, 2015). On the other hand, ingroup love could be weakened when seeing an ingroup person initiate an intimate relationship with an outgroup person. The taboo practiced in many societies that bans marriages with a person of a different ethnic group provides an example.

The examples above suggest that positive or negative relationships are not fixed at all times; rather, they are constantly subject to the influence of relationships with a third party. In Fig. 1, we depict a triadic relational structure to show how ingroup and outgroup relationships adapt. There are three actors in the relationships: ego, an ingroup alter, and an outgroup alter. Panel (a) shows ego’s two dyadic relationships with the two alters in the absence of relationship between the two alters. Panel (b) shows the triadic context where the ingroup alter favors (+) or disfavors (-) the outgroup alter. Panel (c) then shows the context where the outgroup alter favors (+) or disfavors (-) the ingroup alter. How the alter-to-alter relationship influences ego’s relationships with the two alters can be traced by comparing ego’s two relationships in (a) with (b) and (c).

But how does a third relationship influence the original two relationships in a triad? There are a number of theories to answer the question. The first is structural balance theory. This theory argues that people adjust their relationships to pursue structural balance, which is defined as the state where the product of the signs of the three relationships is positive (Heider, 1946; Cartwright and Harary, 1956). Note that while the theory postulates that people adjust their relationships to reach triadic balance, mathematically it takes the adjustment of only one relationship to turn a triad from imbalance to balance, but the theory does not specify which of the two relationships ego would adjust. There are other theories available to address this question.

To help the analysis, we make a further distinction between the “out-degree” and the “in-degree” alter in the alter-to-alter relationship. The out-degree alter refers to the alter who favors or disfavors the other—illustrated by the tail of an arrow, such as the ingroup alter and the outgroup alter in Fig. 1(b) and (c), respectively. The in-degree alter, in contrast, refers to the alter being favored or disfavored by the out-

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