Team of former rivals: A multilateral theory of non-aggression pacts

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Abstract

Why do states form non-aggression pacts? Non-aggression pacts are different from typical alliances because the latter tend to be focused on relationships between members of the alliance and other states, such as by deterring external threats or mediating the resolution of conflicts between an alliance member and a third-party challenger. We offer two contributions that build on existing work. First, we provide a theory that explains why leaders use non-aggression pacts as information mechanisms. Leaders of states that have recently emerged from a rivalry seek to overcome an important information asymmetry: they know the probability of future conflict among the former rivals has decreased, but other actors may fear a resumption of hostilities. Such leaders use non-aggression pacts to signal that the rivalry has truly ended and that future relations are likely to remain peaceful. Second, our analysis recognizes the often multilateral nature of the non-aggression pact formation process. We use the 'k'-adic statistical procedure to model non-aggression pact formation as a multilateral process. To operationalize recent rivalry cessation within a group, we use a network analytic density measure. Consistent with our theory, we find that groups of states with greater densities of recently ended rivalries are significantly more likely to form non-aggression pacts. These results hold across a series of model specifications.

Introduction

Why do states form non-aggression pacts? Non-aggression pacts are different from typical alliances because the latter tend to be focused on relationships between members of the alliance and other states, such as by deterring external threats (Waltz, 1979; Walt, 1987) or mediating the resolution of conflicts between an alliance member and a third-party challenger (Fang, Johnson & Leeds, 2015). Like other alliances (Lake, 1999; Weitsman, 2004; Leeds & Savun, 2007; Fang, Johnson & Leeds, 2015), non-aggression pacts can be usefully conceived of as a type of international institution that members may be able to use to overcome cooperation problems (Long, Nordstrom & Baek, 2007; Mattes & Vonnahme, 2010). Non-aggression pacts are often used to reduce the likelihood of future conflict (Long,

Nordstrom & Baek, 2007; Mattes & Vonnahme, 2010; Warren, 2016).

If non-aggression pacts are designed to reduce conflict, why do states need to write down these commitments? Many international legal instruments, perhaps most importantly the United Nations Charter, create broader commitments to refrain from the use of force. Formal agreements are far from a necessary condition for international cooperation (Smith, 1995; Morrow, 2000). Recent work provides explanations. States formalize their commitments not to enter into conflict with each other in order to generate domestic audience costs for reneging on these commitments (Long, Nordstrom

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& Baek, 2007; Mattes & Vonnahme 2010; Warren, 2016). Non-aggression pacts also allow states to signal to each other their future peaceful intentions, which can be especially important among former rivals (Mattes & Vonnahme, 2010). As (Mattes & Vonnahme, 2010: 928) note, 'states that have a history of conflict or that are rivals may be suspicious of one another and might try to alleviate their fears by concluding agreements that are aimed at preventing armed conflict'.

While existing work has improved our understanding of non-aggression pacts, it has two limitations. First, many states with little interest in going to war with each other never take the step of formalizing this intent, and it is not clear why former rivals should do so if the purpose is to signal peaceful intentions to each other.[1] Second, by focusing on the dyad, existing work does not account for the often multilateral nature of non-aggression pact formation processes. Of the 137 non-aggression pacts in the Alliance Treaties and Obligations (ATOP) dataset (Leeds et al., 2002) that we include in our empirical analysis, 14 include more than two members.[2] But, pacts that include only two states may have resulted from decisions not to include other states, which suggests an underlying process in which a multilateral option was a possible outcome.

This article builds on existing work by providing new theory and empirical results. We begin by focusing on private information. Leaders of states emerging from a rivalry know something other actors may not: that the future likelihood of conflict among the former rivals has significantly decreased. Non-aggression pacts are useful when the probability of future hostilities seems relatively large to other outside actors because it was large in the recent past, but when inside actors know the probability has actually become smaller. Many rivalries endure and recur, so outside actors may be uncertain as to whether rivals that appear to be improving their relations are committed to doing so. Leaders of states that have recently ended a rivalry can use non-aggression pacts to help alleviate this uncertainty.

While existing work on why states join non-aggression pacts empirically tests the effects of the pacts on conflict, we directly analyze factors associated with non-aggression pact formation. Non-aggression pact formation is often the result of processes that involve more than two states. We therefore use the *k*-adic research design proposed by Poast (2010) to account for the multilateral nature of some non-aggression pact formations (and non-formations). To operationalize recent rivalry cessation within groups of states,[3] we use a network analytic measure of density. We find, across a host of empirical specifications, that groups of states with a high density of rivalry cessations are significantly more likely to form non-aggression pacts.

The remainder of this article is organized as follows. The next section summarizes the literature on non-aggression pacts, highlighting the questions left open by existing work. Next, we present our theory regarding the importance of signaling to outside actors in the formation of non-aggression pacts. This section also uses this logic to explain why third-party states are sometimes included in non-aggression pacts. We then describe our research design and offer empirical evidence supporting our claims. The final section concludes.

Non-aggression pacts, conflict, and rivalry

Non-aggression pacts require member-states 'to refrain from military conflict with one another' (Leeds, 2005: 5). By 'non-aggression pact', we are referring to a treaty that includes a non-aggression provision, but does not also include any defensive, offensive, or consultative alliance provisions. Figure 1 shows the number of non-aggression pacts formed per year, according to the ATOP data. Of the 29 non-aggression pacts signed in the 1920s and 1930s, 16 were between states in Europe. After World War II, spikes in non-aggression pact formation occurred in 1960, 1970, 1979, and, most notably, the early 1990s (when Russia, other former Soviet Republics, and Eastern European nations signed a number of non-aggression pacts following the collapse of the Soviet Union).

While non-aggression pacts are commonly included in alliance datasets, scholars recognize that non-aggression pacts are distinct from other alliances (Leeds et al., 2002; Gibler & Sarkees, 2004; Long, Nordstrom & Baek, 2007; Mattes & Vonnahme, 2010). Standard alliances require cooperation in the event of conflict with

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[1] See, generally, Haim (2016) and Kinne (2016).

[2] Five of the 144 non-aggression pacts in the ATOP data were formed after 2001 (ATOPID # 5010, ATOPID # 5015, ATOPID # 5020, ATOPID # 5025, ATOPID # 5030). Removing these five leaves us 139 non-aggression pacts between 1815 and 2001. For two other non-aggression pacts, formation took place in the same year as at least one member-state entered the system, which is a problem for survival analysis. These two pacts are ATOP ID # 3070 in 1949 (when Taiwan became a system member) and ATOP ID # 4375 (when Slovenia became a system member).

[3] Throughout this article, we use the term 'group of states' to refer to any set of states containing two or more members.
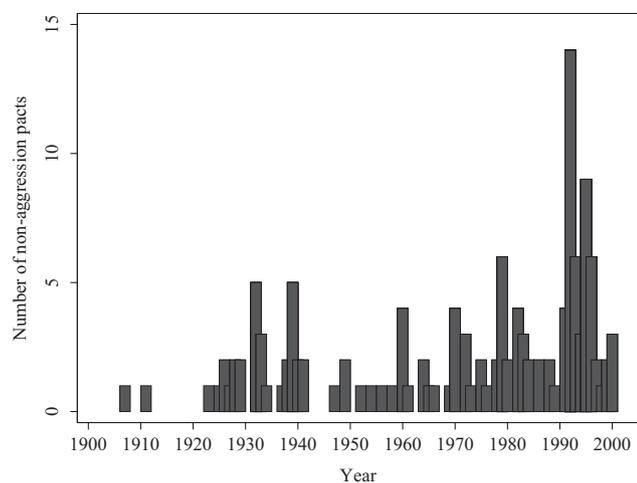
Figure 1. Non-aggression pact formations, 1900 to 2001 (by year)

third parties (Leeds et al., 2002). Such assistance can include defense in case of attack (defense pact), attacking another state (offensive pact), and/or consulting with one another in case of conflict with a third party (entente or consultative pact). Hence, alliances pertain to a signatory's military-oriented interactions with a third party and, with the exception of neutrality pacts, place positive obligations on the signatories. Non-aggression pacts likely follow a process that is distinct from other military alliances: 'because pure non-aggression pacts require no active coordination, [...] their formation and termination are governed by different processes' (Leeds & Savun, 2007: 1125). Mattes & Vonnahme (2010) argue that, as a result, non-aggression pacts are similar to peace treaties and ceasefires in the sense that they focus on future peaceful relations among their members.

Why do states form non-aggression pacts? The formation of these institutions can be puzzling because they are certainly far from necessary in order for states to refrain from aggressive acts against each other. Despite the differences between non-aggression pacts and standard alliances, several insights from the broader alliance literature are relevant to non-aggression pact formation. Like non-aggression pacts, standard alliances can serve to manage conflict by facilitating cooperation and information exchange.

Alliances provide an institutional framework that facilitates continued cooperation. Pressman (2008: 4), building on Axelrod & Keohane (1985), claims that 'alliances facilitate the exchange of information, allow for closer monitoring, and create channels for issue linkage and side payments'. In fact, some alliances explicitly provide a framework for mediating disputes (Gelpi,

1999). A prominent example is Article II of the Rio Pact: 'The High Contracting Parties undertake to submit every controversy which may arise between them to methods of peaceful settlement and to endeavor to settle any such controversy among themselves by means of the procedures in force in the Inter-American System.'[4]

Second, alliances provide costly signals of states' intentions (Morrow, 2000). As Pressman (2008: 4) asserts, 'the act of joining the alliance itself may send signals that are absent in the regular ebb and flow of international affairs [...] the fact that the restrainer in the alliance was willing to absorb some costs and risks associated with the alliance indicates to its new partner[s], the restrainee[s], just how much the former values the policy of alliance restraint'. More importantly, the alliance, particularly if it is multilateral, allows for third parties who can act to help ensure a lack of conflict between the two sides. This enhances the alliance's ability to deter aggression among the alliance members. As Weitsman (2004: 8) states, 'alliances between or among adversaries may be productive. States seek to control threats by tethering them.' Consider NATO. While countering the Soviet threat was certainly a primary motivator in forming the alliance, also crucial was NATO's role in managing a resurgent Germany. NATO General Secretary Lord Ismay famously remarked that NATO has intended to 'keep the Americans in, *the Germans down*, and the Russians out' (quoted in Weitsman, 2004: 2, emphasis added).

Two recent studies examine why states form non-aggression pacts by focusing on conflict behavior among their member-states. Long, Nordstrom & Baek (2007) argue that states form non-aggression pacts in order to avoid future conflict. Non-aggression pacts facilitate information exchange between members, they argue, thus reducing the types of uncertainty that can lead to conflict. In addition, they argue that non-aggression pacts reduce conflict by creating audience costs for aggressors. Their empirical results demonstrate that conflict is significantly less likely among non-aggression pact members. Similarly, Mattes & Vonnahme (2010) focus on the effects of non-aggression pact formation on conflict. They note that states create these institutions 'because there is an expectation that conflict between them is possible or even likely. Countries that have friendly relations do not need assurances of non-aggression because neither side expects that conflict could occur' (Mattes & Vonnahme, 2010: 927).

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[4] Quoted from ATOP ID #3075 Codesheet.

This logic implies that states with a history of rivalry and/or conflict use non-aggression pacts to prevent future conflict with each other. Like Long, Nordstrom & Baek (2007), they argue that non-aggression pacts raise audience costs, both domestically and internationally, which make commitments to peace more credible. Using a two-stage matching design, Mattes & Vonnahme (2010) find significant support for the argument that non-aggression pact formation reduces the likelihood of conflict.

Why do states form non-aggression pacts?

This section provides our theoretical argument for why states form non-aggression pacts. Like previous studies, we focus on the logic of the effects of non-aggression pacts on outside actors. Also like previous studies, we emphasize the role of prior rivalry in the process of pact formation. Our analysis nonetheless departs from existing work in three ways. First, we argue that a key purpose of non-aggression pacts is to signal to outside actors that a rivalry has ceased and that the rivals intend to maintain peaceful relations. Second, by emphasizing signaling to outside actors, our theory allows us to better explain why some non-aggression pacts include states that were not part of a prior rivalry. Finally, our empirical analysis explains non-aggression pact formation and membership directly, whereas existing work analyzes the association between pact formation and subsequent conflict.

Who needs non-aggression pacts?

We begin with Mattes & Vonnahme's (2010) observation that there is a close relationship between rivalry and non-aggression pact formation. We follow Thompson (2001) in defining rivalry as a period in which states view each other as competitors, threats, and enemies. According to the 'strategic rivals' concept of Thompson (2001) and Colaresi, Rasler & Thompson (2007), '[rivalries are] instances in which decision makers in one state perceive another state of relatively equal status as a competitor for the same resources (such as territory) against whom it is likely to become militarily engaged' (Colaresi, Rasler & Thompson, 2007: 15). In other words, '[r]ivalries thus represent a distinctive class of conflict in the sense that rivals deal with each other in a psychologically charged context of path-dependent hostility' (Thompson, 2001: 558). Rivalry is therefore inherently about states' subjective perceptions of each others' status, preferences, and intentions.

This is not to say that actors will *correctly* perceive intentions, be they aggressive or benevolent. Consider a statement by Nicholas de Giers, Russian Foreign Minister, in 1891. de Giers wrote, 'some people imagine that we have designs upon Constantinople' and, for this reason, perceive Russia as a threat (quoted in Michon, 1969: 15). de Giers goes on to state how, in reality, 'nothing would be more embarrassing for Russia' than to conquer Constantinople because it would shift Russia's 'center of gravity' away from St Petersburg. In his classic work *Perceptions and Misperceptions in International Politics*, Jervis (1976) seeks, among other objectives, to explain the mechanisms creating misperceptions among the European powers prior to the onset of World War I. A key point from the Jervis study is summarized well by Levy (2013) in his recent review of the role of psychology in foreign policy scholarship:

> A central proposition of the cognitive paradigm is that an individual's cognitive predispositions or mindsets play a disproportionate role in shaping his or her perceptions. This leads to a general tendency to selective attention to information, to premature cognitive closure, for people to see what they expect to see based on prior belief and world views, and consequently to the perseverance of beliefs. In other words, perception is more theory driven than data driven. (Levy, 2013: 308)

Rivalries can endure over long periods (Goertz & Diehl, 1993), although they can and do end. Indeed, the two longest running rivalries, largely driven by disputes over territory and shared water passages, each persisted for over 160 years (Argentina–Brazil, 1817–1985 and Ecuador–Peru, 1830–1998) (Colaresi, Rasler & Thompson, 2007: 86). A rivalry ends when decision-makers within the states change their perceptions of the other state. For example, Thompson (2001) and Colaresi, Rasler & Thompson (2007) identify the US–Soviet rivalry as ending in 1989, with the Soviet Union's unilateral decision to permit the collapse of the Berlin Wall. Rivalries can end for a host of reasons: by one party defeating the other in war; by one side acknowledging defeat, possibly induced by economic exhaustion; changes in the regime or leadership; or events outside the rivalry leading to a change in strategic priorities (e.g. a shift into isolation) (Colaresi, Rasler & Thompson, 2007: 86–87).

But determining when a rivalry has truly ended can be difficult. As Thompson (2001: 563) writes, '[r]ivalries are sometimes declared to be over and sometimes the declarations can be taken at face value – but only sometimes'. This is because some rivalries can de-escalate and seemingly end, only to restart. Thompson (2001) finds

that 19 rivalries were actually a resumption of prior rivalries between two states. While the gap between such resumptions can sometimes be quite long (e.g. the first rivalry between Saudi Arabia and Yemen ended in 1932, with the second beginning in 1990), other interregnums can be quite short (e.g. 11 years between the first and second Iraq–Saudi Arabia rivalries).

Uncertainty about whether or not a rivalry has truly ended can create an important information asymmetry. During a rivalry, the probability of hostilities between the rival states is likely to be relatively large. When a rivalry ends, the probability of future hostilities between the former rivals decreases significantly (Rasler, Thompson & Ganguly, 2013: 3). Yet, not all actors are equally able to determine whether and when the rivalry has ended, which in turn means that some actors are better able to assess the probability of future hostilities. As noted above, whether or not states are in a rivalry depends on the subjective perceptions (and misperceptions) of leaders and other government officials. We therefore assume that these inside actors have more information about such perceptions and, as a result, more information about whether a rivalry is ongoing or not. These inside actors also have access to information about the causes and consequences of the rivalry cessation that other actors cannot access, such as recent diplomatic exchanges, intelligence reports, and other classified information that they cannot directly reveal. By contrast, actors whose subjective perceptions about the states' relationship do not affect whether or not the states are strategic rivals have less information. When a rivalry ends, inside actors therefore have more information than outside actors about the extent to which the probability of future hostilities has decreased.[5]

Outside actors, such as domestic groups and other states, may have some information about the subjective perceptions of leaders and government officials, but we assume they have less information than the inside actors themselves – and this is the case specifically because the relevant information in this context consists of subjective perceptions. When outside actors attempt to assess the probability of future hostilities between the relevant states, they may have doubts as to whether the rivalry has ended, that is, doubts as to whether the relevant

leaders still perceive each other as rivals. In many cases, states with ongoing rivalries are not actively engaged in hostilities, so a lack of hostilities alone may not overcome the information asymmetry.

This information asymmetry creates a dilemma for leaders of states that have recently ended a rivalry. The end of a rivalry can bring with it many benefits. Ending a rivalry with one state can also help improve relations with other states that were previously more closely aligned with one's rival. After Jordan and Israel signed a peace treaty and ended their rivalry in 1994, for example, Jordan was able to improve its relations with the United States, officially becoming a Major Non-NATO Ally in 1996. Peaceful relations between former rivals can also lead to improvements in economic relations, such as trade and investment, that can lead to joint prosperity. Leaders of states ending a rivalry likely seek to take advantage of such benefits.

If, however, other actors are not able to assess whether a rivalry has ended, and therefore may overestimate the probability of future hostilities between the former rivals, the former rivals may not reap these benefits fully. For example, firms in a former rival state may perceive trade with firms in the other former rival state as too risky if they fear future conflict. Likewise, firms in third-party states may be less willing to invest in either of the former rivals if they fear the instability and potential loss of their investment that may be associated with future hostilities. Finally, leaders of states currently aligned more closely with one of the former rivals may be hesitant to improve their ties to the other former rival without a clear signal that the rivalry has truly ended.

This logic helps explain both why non-aggression pacts are relatively rare and in which situations non-aggression pacts are most likely to be used. At any given time, most states are unlikely to initiate hostilities with most other states. Outside actors can correctly assess that such probabilities are small. The leaders of Nepal and El Salvador, for example, have no need to form a non-aggression pact with each in order to signal to other actors that they intend to maintain peaceful relations. At the other extreme, when rival states expect their rivalry to continue, they will not agree to refrain from aggression in the future. In both such scenarios, the information asymmetry identified above is not relevant. The asymmetry is relevant, and the signal is useful, when the probability of future hostilities seems relatively large to outside actors because it was large in the recent past, but when inside actors have private information that the probability has changed and

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[5] Of course, some degree of uncertainty likely exists even among inside actors. For example, actors with differing foreign policy preferences might exist in the same government, raising concern about whether leader turnover might result in a resumption of the rivalry.

decreased. The asymmetry is especially important in the context of strategic rivalries because the relevant information consists of the subjective perceptions of inside actors.

As a result, leaders of states that recently emerged from a rivalry have important incentives to clearly signal that the probability of hostilities between them has significantly decreased. We argue that this is an important explanation for the formation of non-aggression pacts. We agree that one reason for the formation of these pacts may be a commitment to preventing future aggression, as others have argued, and in many cases non-aggression pacts are formed for both reasons. Our logic suggests that non-aggression pacts are, in part, instruments for state leaders to signal to third parties (domestic and international) that a rivalry has ended. Moreover, because non-aggression pacts are associated with a lower likelihood of future conflict, this signal is informative (Long, Nordstrom & Baek, 2007; Mattes & Vonnahme, 2010).

We illustrate our argument using the example of the USA–Russia Charter for Partnership and Friendship, a non-aggression pact formed on 17 June 1992.[6] The USA–Soviet Cold War rivalry ended in 1989 with the fall of the Berlin Wall. Yet, given the long history of the rivalry, some observers feared a resumption of the rivalry in the near future, particularly with contentious issues, such as the reunification of Germany, still to be rectified (Gaddis, 2006: 250). Fears were inflamed by events such as the attempted coup by Soviet hardliners in 1991 and the beginning of the wars in former Yugoslavia.

Thus, when George HW Bush and Boris Yeltsin signed the USA–Russia Charter, they attempted to send clear signals that peaceful relations between the former rivals would endure. Both leaders made sure to express a new era in economic relations between the powers. Bush stated: 'Let me just say to the American people: Our support for Russia is unshakable because it is in our interest.' Yeltsin echoed that

> the documents that we have signed today are not designed to define what has already been established in context but to find new ways to go forward. And the treaties and agreements that we have signed today do not just pertain to the two countries of ours. They are a sketch for a future world. They are characteristic of the kind of features that we want to see in this world. This

world is becoming more attractive, more humane, kinder than we see today.[7]

As our general argument suggests, both leaders stressed the importance of economic relations. Yeltsin noted that '[a]mong the Russian–American relations, there are two things that are most important to my mind: strategic arms limitations and economic cooperation'. He added that

> a very important area in our relationship is designing a good basis for fruitful economic cooperation and establishing all kinds of contacts in this economic sphere. We have concluded very important agreements that have removed obstacles in this way and to make it more attractive for businessmen to join in this effort, and this is very important for our country at this time. After 70 years of travesty as far as personal property was concerned, now private property is becoming ever more important and will become even more so in times to come.

Likewise, Bush stated that

> At this summit we've also opened a new chapter in our economic relationship. The economic agreements that we have signed today will pave the way for trade and investment in Russia, as will most-favored-nation status which takes effect today. We hope very much that Russia and the International Monetary Fund can reach a standby agreement soon in order to unlock the G-7's economic support package.[8]

The role of third parties: Non-aggression pact formation as a multilateral process

In some cases, non-aggression pacts include more than two members. The signaling logic helps us explain why, in some cases, former rivals join with third parties to form non-aggression pacts.[9] The inclusion of a third

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[6] Cited in International Legal Materials (ILM) Vol. 21: 782–789, 785.

[7] Transcript from the Press Conference at the 17 July 1992 signing of the USA–Russia Charter for Partnership and Friendship, available at http://www.presidency.ucsb.edu/ws/?pid=21101, accessed on 27 January 2015.

[8] Transcript from the Press Conference at the 17 July 1992 signing of the USA–Russia Charter for Partnership and Friendship, available at http://www.presidency.ucsb.edu/ws/?pid=21101. See also Haim (2016).

[9] An example of such an agreement is the original ASEAN non-aggression pact, formed by Malaysia, Singapore, Indonesia, Philippines, and Thailand in 1976. Indonesia and Malaysia had ended their rivalry, whereas the other members had not been involved in this rivalry.

party can strengthen the signal sent by the former rivals that their probability of future hostilities has, indeed, decreased. Generally, when a third party joins an alliance, this can signal to other states that the alliance partners are more serious about their obligations (Pressman, 2008). In the context of non-aggression pacts, having participated in the (generally private) negotiations leading up to the pact formation, the third-party state has also obtained private information about the former rival states' perceptions of each other. By joining the non-aggression pact based on this private information, the third party can strengthen the signal to other outside actors that the rivalry has ended. In addition, in some cases non-aggression pacts terminate for all members if violated by any member – for example, the 1938 Salonika Agreement between Bulgaria, Romania, Turkey, Yugoslavia, and Greece terminated in 1940 when Bulgaria made territorial demands on Romania. A third party's willingness to join such an agreement signals that it believes, again based on information revealed in negotiations that may not be public, that the rivalry has ended.

An alternative logic might suggest that a third party may make the commitment to non-aggression between the former rivals more credible. This logic is often the case in other types of alliances, in which states agree to come to each other's aid if attacked. Yet, this does not apply to non-aggression pacts. A non-former-rival third party in a non-aggression pact simply agrees not to commit aggression against either of the former rivals. If one of the former rivals were to violate the pact, the third party would be under no obligation to defend the attacked state. The inclusion of such a party in a non-aggression pact, therefore, does not make the commitments made by the former rivals more credible.

Existing analyses of non-aggression pacts conceive of them as having been formed as a result of bilateral processes. Yet, non-aggression pacts are often formed as a result of multilateral processes. Even when the outcome of the formation process is a bilateral pact, the member-states may have considered including other members but decided against doing so. Often, non-aggression pact formation is multilateral in part because the rivalries preceding the pact are also multilateral. While the empirical literature often models rivalries as dyadic, the underlying facts that gave rise to these rivalries are often multilateral events. For example, in rivalry datasets, Israel is generally coded as having long-term rivalries with all of its neighbors, but these rivalries are clearly part of the multilateral Arab–Israeli conflict rather than entirely separate bilateral processes.

Our argument is analogous to that of Fordham & Poast (forthcoming) with respect to alliances. They claim that all alliances, even those between two parties, are multilateral in the sense that states must consider who to include and not include in the alliance pact. Just as consumers select among 'baskets' of goods, leaders must assess the whole composition of the potential alliance. Doing so may lead to the formation of a purely bilateral pact, but this determination was the outcome of deciding that the inclusion of additional members was suboptimal.

The argument in the previous section suggests that non-aggression pact formation should be more likely among states that have recently ended a rivalry. Yet, because non-aggression pact formation can be the result of a multilateral process, it is important that we consider how this might affect non-aggression pact formation among groups of states. In a given group of states, there may be relatively few or relatively many recent rivals. A group with few recently ended rivalries will have little incentive to form a non-aggression pact. In such a group, there may be little need to use such an institution to signal future peaceful intentions because most of the group has little history of perceiving each other as potentially hostile. Within such a group, individual dyads that were involved in recent rivalries may be more likely to form non-aggression pacts, but the group is unlikely to do so *as a group*. By contrast, the more rivalries that recently ended in a group, the more incentive there will be for the group to clearly signal that such rivalries have ended by forming a group non-aggression pact. This leads to our hypothesis:

> *Hypothesis:* Groups of two or more states among which more rivalries have recently ended are more likely to form non-aggression pacts.

Research design

This section describes how our research design takes into account the multilateral nature of some non-aggression pact formation. We also explain below how we use the network analytic concept of density to operationalize the extent to which rivalries have recently ended within groups of states.

Dependent variable and unit of analysis

Drawing from the ATOP dataset, we identify 137 non-aggression pacts formed between 1815 and 2001. Of these, 29 also contain neutrality provisions (but do not contain offensive, defensive, or consultative

commitments). While the majority (123) of non-aggression pacts are bilateral, the 14 multilateral non-aggression pacts include most of the dyadic non-aggression ties.[10] More precisely, five of the non-aggression pacts are trilateral, one has four members, four have five members, one has 13 members, one has 14 members, one has 15 members, and one has 31 members (the Helsinki Final Act, ATOP ID #3740). These create 867 unique state-to-state non-aggression dyadic ties.[11]

To account for the multilateral nature of some non-aggression pact formations, we follow Fordham & Poast (forthcoming) and Poast (2010) by using *k*-adic data. A *k*-ad is a unit with *k* members, where $k \geq 2$. Hence, a dyad is a special case of *k*-adic data, where $k = 2$. A *k*-adic research design allows us to capture characteristics of a group of states, whether that group contains 2, 3, 4, or more members. This modeling strategy does not assume that all non-aggression pacts are multilateral nor even that all non-aggression pacts could have been multilateral. Instead, relative to a traditional dyadic model, our modeling strategy relaxes the assumption that all such pacts are bilateral and could only have been bilateral. That is, what the *k*-adic models do, relative to dyadic models, is relax the assumption that the relevant unit of analysis is always a group of two states.

Creating a *k*-adic dataset is done in two steps. First, we must construct a dataset of *k*-ads in which the event of interest occurred. With respect to non-aggression pact formation, each formation event, regardless of the number of participants, is an observation. Hence, one 'event' *k*-ad is the 1992 bilateral pact between the United States and Russia, while another 'event' *k*-ad observation is the 1986 trilateral pact between Guinea, Liberia, and Sierra Leone. It is possible (even likely) that the formation of an earlier bilateral pact affects the probability of being involved in a later pact (of any size).

Second, we construct a dataset of the 'non-event' *k*-ads. Here, a 'non-event' *k*-ad is a group that did not form a non-aggression pact. On the one hand, the practice used in constructing dyadic datasets could suffice, that

is, include all possible *k*-adic combinations of states in the dataset so that some *k*-ads witnessed the formation of a pact, while others (most, in fact) did not. In practice, this leads to computationally unmanageably large datasets. For example, if one had 100 countries in a dataset, all combinations of 100, 99, 98, 97, ..., down to two countries would result in a dataset of 1.26765×10^{30} observations!

For this reason, Poast (2010) shows that one can use choice-based sampling to create a feasibly sized sample of 'non-event' *k*-ads. Choice-based sampling entails creating a random sample of 'non-event' observations that are stratified according to the distribution of observations in which the event occurred. How many 'non-event' observations should the analyst collect? According to King & Zeng (2001: 702), one can collect anywhere from two to five times more non-event observations as event observations. Consider a simple example. Suppose the 'event' *k*-ads dataset from step one contains 100 dyads that formed a pact (i.e. there were 100 bilateral non-aggression pacts formed) and 50 triads that formed a pact (i.e. there were 50 trilateral non-aggression pacts formed). If this is the case, the 'non-event' sample could contain 200 dyads that did not witness the formation of a pact and 100 triads that did not witness the formation of a pact. Stated differently, if one is working with a binary dependent variable (where the dependent variable, Y, equals 1 when the event occurred, 0 otherwise), then the final dataset will have 100 dyads where $Y = 1$, 50 triads where $Y = 1$, 200 dyads where $Y = 0$, and 100 triads where $Y = 0$.

We can now combine the 'event' and 'non-event' *k*-ads. In our case, we use the 137 non-aggression pact formations as our event *k*-ads. The dependent variable is *Non-aggression pact formation*, a binary variable coded with a 1 in year *t* for *k*-ad *i*, when *k*-ad *i* formed a non-aggression pact in year *t*. Next, we create a random sample of $2*137 = 274$ *k*-ads that did not witness the formation of a non-aggression pact.[12] The distribution of these 274 *k*-ads is approximately the same as the *k*-ads that witnessed non-aggression pact formation. We next create a dataset with a panel structure, such that the unit of analysis is the *k*-ad-year. It should be noted that our panel dataset is unbalanced, as each *k*-ad only has yearly values in the years in which each state in a *k*-ad was a member of the international system. Once we set the data for survival analysis (meaning we disregard

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[10] The 14 multilateral non-aggression pacts were formed in 1907 (ATOP ID # 1450), 1923 (ATOP ID # 2105), 1929 (ATOP ID # 2240), 1938 (ATOP ID # 2425), 1975 (ATOP ID # 3740), 1976 (ATOP ID # 3755), 1978 (ATOP ID # 3810), 1979 (ATOP ID # 3853), 1983 (ATOP ID # 3948), 1986 (ATOP ID # 3982), 1988 (ATOP ID # 3990), 1995 (ATOP ID # 4750), 1996 (ATOP ID # 4810), and 2001 (ATOP ID # 4985).

[11] These 867 dyads do not include ATOP ID # 2105 as it contains the same five states as ATOP ID # 1450.

[12] We randomly sample only from those *k*-ads that are made up of countries that exist in the international system in a given year.

observations following the formation of a non-aggression pact) and account for the availability of data for our independent variables (see below), we have a total of 10,668 observations.

Key independent variable: Rivalry cessation density

We rely on the 'strategic rivals' concept of Thompson (2001) and Colaresi, Rasler & Thompson (2007) to identify when states view one another as rivals and when that rivalry ends. Thompson (2001) and Colaresi, Rasler & Thompson (2007) draw upon diplomatic and political histories of individual states' foreign policy activities to determine when decisionmakers perceived one another as rivals. Thompson identifies 173 rivalries between 1816 and 2001, covering a wide range of states, such as Afghanistan and Pakistan (1947–79), Britain and Germany (1896–1918), Chad and Libya (1966–94), and the Soviet Union and the United States (1945–89). We use all rivalries in the Thompson data.

In our main specifications, we focus on rivalries that have ended in the ten years prior to the year of interest.[13] If we were working with solely dyadic data, the identification of rivalry cessation would be quite straightforward: if states i and j ended their rivalry in the prior ten years, then a *Rivalry cessation* variable could take on a value of 1. But since our data have a k-adic structure, we must identify the influence of rivalry cessation within each k-ad.

The tools of network analysis offer a principled approach for coding the characteristics of a group of states.[14] More precisely, network analysis can provide guidance for coding the extent to which rivalry cessation influences non-aggression pact formation within a k-ad. We conceptualize a single k-ad as a network. Because some (but not necessarily all) members of the k-ad could have been rivals and some (but not necessarily all) of these rivalries could have ended in the prior ten years, we can use the network's density of rival cessation to capture the influence of rivalry cessation in this k-ad. Network density is the proportion of possible connections that are actually present in a network (Wasserman & Faust, 1994: 101; Maoz, 2010: 40). More precisely, for each k-ad h in year t, we measure the *Rivalry cessation density*, $D_{t,h}$, which is defined as:

$$D_{t,h} = \frac{2E_{t,h}}{N_{t,h}(N_{t,h} - 1)} \quad (1)$$

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[13] Only in one case in our data did a rivalry termination and non-aggression pact formation occur in the same year.
[14] See, generally, Maoz (2009) and Lupu & Traag (2013).

Table I. Relationship between non-aggression pact formation and rivalry cessation density

	Non-aggression pact formation	
	Yes	*No*
Mean rivalry cessation density	0.037	0.007
	N = 137	N = 10,531

Difference in means is statistically significant at the 0.99 confidence level (two-tailed *t*-test).

where $E_{t,h}$ is the number of rivalries that ended in the prior ten years and $N_{t,h}$ is the number of states in the k-ad-year. *Rivalry cessation density* is therefore a ratio between the rivalries that have ended in the group of states in the past ten years and the total number of possible dyadic ties in the group. For example, in a simple dyad, *Rivalry cessation density* would be equal to 1 if the dyad had ended a rivalry in the past ten years and 0 otherwise. In a group of three states, A, B, and C, in which states A and B had ended a rivalry in the past ten years, *Rivalry cessation density* would be equal to ⅓. In a group of seven states in which two pairs of states had ended rivalries in the past ten years, *Rivalry cessation density* would be equal to 0.095 (or 2/21). Overall, this variable has a value ranging from 0 (no rivalries ceased) to 1 (all of the states in the k-ad were rivals and ended their rivalries). As described below, we can conduct additional analysis to demonstrate the extent to which our results are sensitive to the choice of a ten-year lag.

Descriptive analysis

We begin with a look at the raw data. A simple cross-tabulation appears to support our hypothesis regarding the relationship between rivalry cessation and non-aggression pact formation (Table I). For the 10,531 k-ad years that did not witness the formation of a non-aggression pact, the average value of *Rivalry cessation density* is 0.007. In contrast, for the 137 k-ad years that witnessed the formation of a non-aggression pact, the average value of *Rivalry cessation density* is 0.037, a four-fold increase in the observed likelihood of non-aggression pact formation. The difference between the two rates is statistically significant from zero at the 0.99 confidence level. This is consistent with our primary hypothesis: ending a rivalry is associated with an increased likelihood that a group of states will form a non-aggression pact. Table II provides additional summary information regarding our sample and key variables. Several points about the data are worth noting.

Table II. Non-aggression pact formations by k-ad size

k-ad size	Mean rivalry cessation density	Non-aggression pacts	Total non-aggression pact members	Non-aggression pacts with at least one pair of former rivals
2	0.007	123	246	11
3	0.000	5	15	0
4	0.000	1	4	0
5	0.002	4	20	1
> 5	3.26E-6	4	66	3

The first is that, while most (123) non-aggression pacts are bilateral, the 14 multilateral non-aggression pacts involve a total of 105 members. Of these 14 multilateral non-aggression pacts, four involve at least one pair of former rivals. In a purely dyadic model, these multilateral non-aggression pacts would be broken apart into many separate dyadic outcomes. Many of the dyads would not be coded as former rivals, but in reality have joined a non-aggression pact with other dyads who are former rivals. If and to the extent such a former rivalry affected the non-aggression pact formation process, such a model would be ill-suited to capturing that effect.[15] Finally, Table II indicates that *Rivalry cessation density* tends to be larger in smaller k-ads.

While useful, the results in Tables I and II do not account for potentially confounding variables. Multivariate analysis enables us to account for potential complications in the data that can undermine conclusions based on simply observing the data. Therefore, we now turn to describing our control variables before presenting the results from our multivariate analysis.

Control variables

We control for several additional variables that may confound the relationship identified in Table II. First, we control for the number of members in the k-ad. As Table II suggests, *Rivalry cessation density* tends to be smaller in larger k-ads, and this could bias our results.[16] Because non-aggression pacts are associated with a reduced probability of conflict onset (Long, Nordstrom & Baek, 2007; Mattes & Vonnahme, 2010), it might be the case that experiencing a conflict in the recent past can increase the likelihood of non-aggression pact formation. Therefore, we control for the proportion of k-ad members that fought a MID against one another in the previous ten years. We note that China and the Soviet Union/Russia formed more non-aggression pacts than

other states. To test whether the relationships we estimate are driven by these two outliers, in Model 3 we add indicators for whether these states are members of the applicable k-ad.

In Model 4, we add several controls common to the alliance formation literature. Although we, and others, have argued that non-aggression pacts are distinct from alliances in important ways, others may view these pacts as types of alliances. We therefore control for the presence of common threats, which might influence states' likelihood of forming alliance and/or non-aggression pacts. We draw from the Thompson data to create a measure of threat density, meaning the proportion of the k-ad's dyadic combinations that share a threat. If $k = 2$ (meaning the group is a dyad), then the threat density can be equal to 0 (meaning the one possible dyadic combination from this k-ad does not share a threat) or 1 (meaning the one possible dyadic combination from this k-ad does share a threat). If $k = 3$, then the threat density can take on a host of values. For example, three states (A, B, and C) generate three possible dyadic combinations (A-B, A-C, B-C). Hence, if state A and B share a threat in year t and states A and C share a threat in year t, but B and C do not share a threat in year t, then the threat density for the group in year t is $\frac{2}{3}$.

Regime type is thought to have important relationships with both the probability of conflict and rivalry between states and their likelihood of military cooperation (Siverson & Emmons, 1991; Leeds, 1999; Lai & Reiter, 2000; Gibler & Wolford, 2006). We control for this in two ways. Much of the alliance formation literature controls for the lower of a dyad's Polity IV scores, and we control for the lowest score in the k-ad. States with very different regime types may be more likely to be rivals and may also be unlikely to form alliances (Lai & Reiter, 2000). We therefore also control for the largest dyadic difference in Polity scores in the k-ad.

States with similar foreign policies may be less likely to be rivals, but more likely to be allies. Therefore, we follow many recent studies (Lai & Reiter, 2000; Gibler & Wolford, 2006; Gibler, 2008; Fordham, 2010) by

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[15] We discuss this point in further detail in the Online appendix.
[16] Our results are robust to the exclusion of this variable.

controlling for the Signorino & Ritter (1999) S score of foreign policy similarity. Like Fordham & Poast (forthcoming), we operationalize this for the *k*-adic unit of analysis by using the mean S score of all the dyads in the *k*-ad.

We include a measure of geographic distance between *k*-ad members. States that are geographically closer together are more likely to be rivals, whereas distant states may be less likely to form non-aggression pacts because a conflict between them is unlikely. For each dyad in the *k*-ad, we measure the square root of the capital-to-capital distance (Singer & Small, 1982), unless states are contiguous, in which case distance is set to 0. We convert these measures by following the 'weakest link' principle of Oneal & Russett (1997) and including in our model the geographic distance between the most distant pair of states in the *k*-ad (Poast, 2010).[17]

To control for the power of the states in the *k*-ad, we use the total Composite Index of National Capabilities (CINC) score (Singer, Bremer & Stuckey, 1972) of the *k*-ad members and its square. As Riker (1962) argues generally and Fordham & Poast (forthcoming) argue is the case with respect to alliance formations, the participants of a pact should seek to reach an optimal level of military capabilities, but not aggregate beyond it. This implies that additional capabilities, via additional members to a pact, can raise the probability of formation, but only up to a point, after which they may lower the probability.

Multivariate analysis results

We test our hypothesis using survival (event history) analysis. The central concept in survival analysis is the hazard function or hazard rate, $h(t)$. The hazard rate typically has the following form: $h(t|x) = h_0(t)\exp^{x\beta}$ where $h_0(t)$ is the baseline hazard rate and $x\beta$ denotes the covariates and coefficients on these covariates. This is the probability that an event will occur at a particular point in time given a set of covariates and that the event has yet to occur. For our purposes, the event in question is the formation of a non-aggression pact. The hazard rate has two components. The first is a set of covariates that are hypothesized to systematically affect the timing of an event. The second is the baseline hazard function that indicates the rate of event occurrence when all the covariates are zero, that is, the baseline hazard reflects how the rate of event occurrence changes with time only.

We employ a Cox proportional hazard model with time-varying covariates, as this allows us to estimate the effect of the covariates on the hazard rate without requiring us to specify a particular parametric form for the baseline hazard. According to our argument, the cessation of a rivalry is an important determinant of non-aggression pact formation. This means the absence of rivalry cessation from a *k*-ad serves as the baseline case, with a higher rate of cessation leading to a higher probability of non-aggression pact formation.

An important assumption underpinning the use of hazard models, particularly the Cox model, is the proportional hazards assumption. This assumption holds that the effect of the covariates in the specified model does not change over time (Box-Steffensmeier & Jones, 2004). A Schoenfeld residual test indicates that we are not violating this assumption, as we fail to reject the null hypothesis of no relationship between the residuals and time (chi-squared statistic 8 with 11 degrees of freedom and a *p*-value 0.71).

Table III reports the results from several hazard models. Models 1 through 4 progressively add control variables in order to illustrate the insensitivity of the coefficient on *Rivalry cessation density* to the addition of controls. Across all five models, the *Rivalry cessation density* hazard ratio remains large, positive, and statistically significant (at the 0.99 confidence level). We use Model 4 to consider the hazard ratio associated with *Rivalry cessation density*. A hazard ratio of 2 would suggests that a one-unit change in *Rivalry cessation density* would increase the likelihood of non-aggression pact formation by 100%. Using Model 4, the hazard ratio associated with *Rivalry cessation density* is 5.16, indicating that going from no rivalry cessations to a *Rivalry cessation density* of 1 will result in a 416% increase in the probability of non-aggression pact formation.

Robustness tests

We estimate several additional models to test the robustness of our results. First, we begin by testing the robustness of our focus on *Rivalry cessation density* in the preceding ten years by estimating models that change this time period to five years and 15 years. Second, some non-aggression pacts include multiple members that were already joint members of another non-aggression pact. We conduct a robustness test that controls for the proportion of the *k*-ad members that were previously members of a pact. Third, because the non-aggression pacts that contain more than five members appear to be outliers in the data, and therefore may result from qualitatively

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[17] Fordham & Poast (forthcoming) also include the proportion of contiguous states in the *k*-ad, but find this variable to be statistically insignificant.

Table III. Non-aggression pact formation, survival analysis

	(1) Base model	(2) + Key controls	(3) + Russia and China fixed effects	(4) + Other controls
Main explanatory variable				
Rivalry cessation density in past ten years	6.55**	6.09**	6.16**	5.16**
	(3.62)	(3.32)	(3.42)	(2.89)
Key control variables				
Number of members		1.09**	1.09**	1.23**
		(0.03)	(0.03)	(0.04)
Proportion of *k*-ad members fought a MID against one another in the past ten years		1.96**	1.75*	1.25
		(0.42)	(0.41)	(0.29)
Russia			0.92	1.16
			(0.23)	(0.48)
China			1.78	1.87
			(0.53)	(0.76)
Controls common to alliance studies				
Total CINC				34.61
				(132.05)
Total CINC^2				0.00*
				(0.00)
Maximum distance				1.00**
				(0.00)
Maximum Polity difference				1.04*
				(0.02)
Minimum Polity				1.02
				(0.02)
Mean S				4.29**
				(2.40)
Number of observations	10,668	10,668	10,668	10,499

*$p < 0.05$, **$p < 0.01$. Standard errors computed by $exp(\beta) * se(\beta)$, where β is the coefficient that produced the reported hazard ratio. Test of proportional hazard assumption (Model 4) produces p-value 0.71, indicating no violation of the assumption.

different formation processes, we estimate a robustness test that excludes these pacts from the data. Finally, we estimate a robustness test that accounts for five cases in which dyads formed more than one non-aggression pact (e.g. the Soviet Union/Russia and Lithuania in 1926 and 1991). The results of these models, reported in the Online appendix, are consistent with our main models.

Conclusions

Existing studies of non-aggression pacts have explained much about the effects of these agreements. These studies focus on how non-aggression MID pacts function as devices by which states commit to refraining from hostile activities toward each other. This article builds on this literature by directly focusing on the non-aggression pact formation process. We have argued that, in addition to their function as a commitment device, non-aggression pacts can also be used as a signaling device.

When interstate rivalries end, the leaders of those states face an important dilemma. Previously, the probability of conflict between their states was relatively large, but the end of the rivalry has decreased it significantly. Outside actors, both domestically and internationally, are nonetheless concerned that the rivalry may soon resume. Without the information the leaders have, other actors may continue to estimate the likelihood of future conflict as relatively large. To overcome this information asymmetry, leaders use non-aggression pacts to signal that the rivalry has truly ended and that they intend to refrain from future conflicts.

Yet, the non-aggression pact formation process is not purely bilateral. Non-aggression pacts sometimes include more than two states, and we may not fully observe the extent to which states that formed bilateral pacts considered including additional states. As a result, a group of two or more states is likely to form a non-aggression pact when the group contains a relatively dense network of recently ended rivalries. We combine a *k*-adic research

design with a network analytic measurement strategy to test this theory. Across a range of model specifications, we find support for the hypothesis that groups of states with greater *Rivalry cessation density* are more likely to form non-aggression pacts.

Our article contributes to a broader understanding of how network analysis tools can be used in international relations research. As discussed in the Introduction to this Special Issue, one application of network analysis is as a measurement tool, which can be used to estimate the properties of individual states or groups of states in the system, while accounting for the structure of the system. One of the challenges of using k-adic data is determining the most appropriate operationalization of variables, especially when properties of the k-ad are being operationalized.[18] As our approach to operationalizing rivalry and threat within a k-ad demonstrates, network analysis provides a set of tools that take into account the structure and full set of relationships within the k-ad and can be used to measure important aspects of the k-ad. We hope others using k-adic data will continue to integrate the use of network analytic tools.

Our arguments and evidence suggest several areas for further research. First, like Mattes & Vonnahme (2010), we believe that non-aggression pacts are analytically similar to peace treaties and ceasefires. The literature on those institutions indicates that the involvement of third parties is crucial to both the formation of the institution and its success (Fortna, 2004). In addition, as we have argued, the non-aggression pact formation process is often multilateral. Third parties may therefore play important roles in the formation and effects of non-aggression pacts even when they are not members of such pacts. A pair of states, for example, may be more likely to form a non-aggression pact when a third-party state makes an informal (or even tacit) commitment to confer some benefits upon those states for maintaining peaceful relations or a commitment to helping the non-aggression pact member-states maintain the peace. In other words, the role of third parties in non-aggression pacts may be far more complex than what we can explore in the space of this article.

Second, our argument also has broader implications for researchers interested in alliances. While preventing conflicts between alliance members and non-members is an important function of alliances, many argue that states use alliances for an alternative purpose: to manage conflicts *between* allies (Gelpi, 1999; Weitsman, 2004; Pressman, 2008). Yet, the empirical literature on the effects of alliances offers conflicting findings. For example, Lai & Reiter (2000) find that conflictual relations reduce the probability of alliance formation, Gibler (2008) finds that conflictual relations increase the probability of alliance formation, and Cranmer, Desmarais & Menninga (2012) find that conflictual relations have no influence on the probability of alliance formation. We hope to shed light on this debate and build on this article by directly comparing non-aggression pacts, alliances that contain non-aggression provisions, and alliances with no non-aggression provisions. By analyzing the ways in which the formation processes of these three institutions differ, we hope to better understand the extent to which their effects on conflict may differ.

Replication data

All analyses were conducted using Stata 13. The data and command code for the empirical analysis, along with the Online appendix, can be found at http://www.prio.org/jpr/datasets.

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[18] This is, of course, also a challenge when using dyadic data, but in that context the options (e.g. minimum, mean, maximum, ratio) are fewer.

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