CLASH: Climate (change) and cultural evolution of intergroup conflict

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Abstract

Aggression and violence levels generally increase as one moves closer to the equator, but why? We developed a new theoretical model, CLimate, Aggression, and Self-control in Humans (CLASH; van Lange, Rinderu, & Bushman, 2017b, 2017c), to understand differences within and between countries in aggression and violence in terms of differences in climate. Colder temperatures, and especially larger degrees of seasonal variation in climate, call for individuals and groups to adopt a slower life history strategy, revealed in a greater focus on the future (vs. present) and a stronger focus on self-control—variables that are known to inhibit aggression and violence. Other variables (e.g., wealth, income inequality, parasite stress) are also linked to both climate differences and to aggression and violence differences. When people think of the consequences of climate change, they rarely think of the impact on aggression and violence levels, but they should. CLASH has broad implications for the effects of climate change on intergroup conflict.

"Peace is not the absence of conflict but the presence of creative alternatives for responding to conflict—alternatives to passive or aggressive responses, alternatives to violence."

Dorothy Thompson, American journalist and radio broadcaster.

Understanding the roots of human conflict, and especially aggression and violence among groups, is one of the most challenging tasks we face in the world today. This sentiment is shared by scientists across a number of disciplines, and it is one that many professionals beyond the borders of science can "see" and appreciate (e.g., Ricard, 2015). Climate might provide one creative solution to the problem of aggression and violence.

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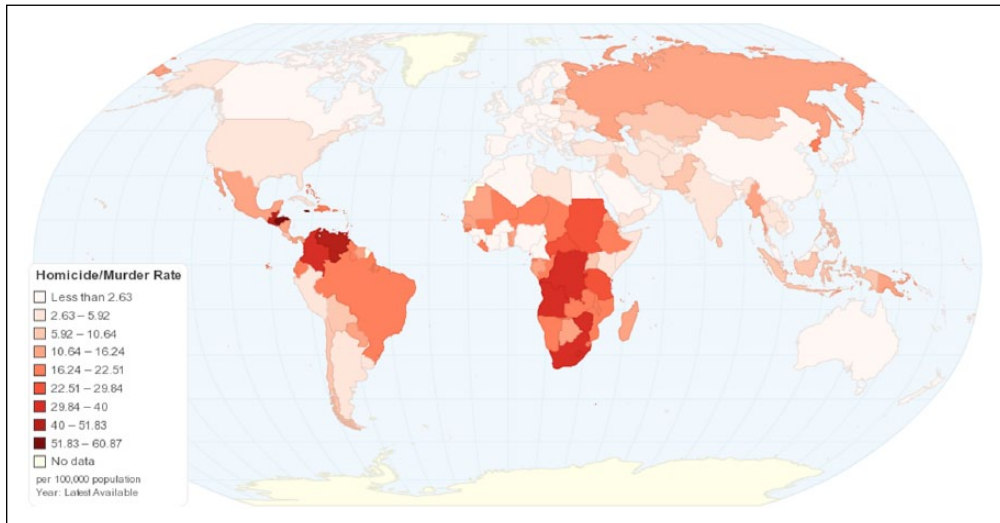Email: p.a.m.van.lange@vu.nl

Figure 1. Homicide rates per 100,000 across the globe.
Source: United Nations Office on Drugs and Crime's (UNODC) homicides statistics (2013).

For example, consider homicide rates around the world. When looking at the global map of homicide (see Figure 1), two features are especially striking. First, homicide rates vary dramatically around the world. For example, homicide rates per 100,000 people in Honduras (84.6), South Africa (33.0), or Brazil (24.6) are many times higher than in Japan (0.3), Australia (1.0), or the US (3.9). Second, homicide rates tend to be higher near the equator (Walker, Wilson, Chappell, & Weatherburn, 1990). There are exceptions to this general trend, such as the high homicide rate in Russia (north of the equator) and in South Africa (south of the equator). Of course, it is also hotter near the equator, where violence levels also tend to "flare." Hot temperatures are often associated with higher aggression and violence levels. For example, a recent meta-analysis involving 56 cross-national studies found that various forms of aggression and violence across a variety of temporal and spatial scales are higher in countries with higher average temperatures (Burke, Hsiang, & Miguel, 2015). These patterns are quite strong: climate is associated with violence in 46 of 56 (82%) of published studies, and temperature is associated with violence in 20 out of 24 studies (83%; see Burke et al., 2015). Moreover, effects were stronger for

temperature than for rainfall, and were stronger for aggression and violence between groups than between individuals. One standard deviation increase in temperature was associated with an 11.3% increase in intergroup conflict but only a 2.1% increase in interpersonal conflict. These findings are of special import to readers of this journal, who are interested in intergroup relations.

How can we understand these two striking features? Most models or theories focus on either heat as a primary aversive variable that triggers aggression (general aggression model [GAM]; Anderson & Bushman, 2002), or the notion that people are more likely to meet face-to-face during warmer weather where aggression and violence are likely to unfold (routine activity theory; Cohen & Felson, 1979). However, neither of these models can explain the large variation in aggression and violence levels worldwide, such as the enormous homicide differences depicted in Figure 1 (for a discussion, see van Lange et al., 2017b).

We offer an alternative, *climatological* model. It is based on the assumption that people living in different parts of the world, and even different parts of the same country, adapt to different climatological circumstances. Moreover, our perspective assumes that people, as individuals and groups,
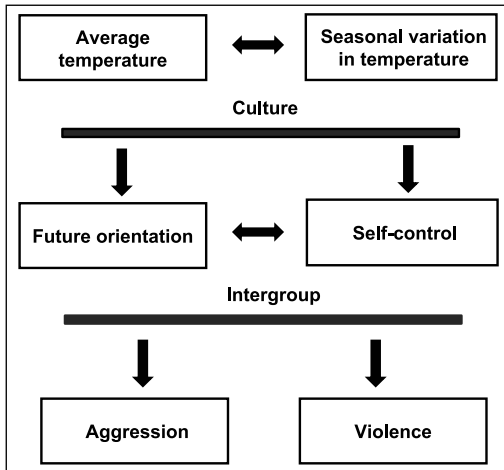
Figure 2. A model of Climate, Aggression, and Self-control in Humans (CLASH; adapted from Van Lange et al., 2017b).

create and maintain cultures (e.g., norms, institutes, and markets) that adapt to relatively *stable* climatological circumstances. Although climate includes many aspects, we focus on temperature as the primary feature of climate.

CLASH

We proposed a new model of aggression and violence, called CLimate, Aggression, and Self-control in Humans (CLASH; van Lange et al., 2017b), to understand differences in aggression and violence within and between countries in terms of differences in climate (see Figure 2). To explicate the logic and to facilitate empirical tests, we have advanced two broad propositions of CLASH (for an extensive discussion, partly summarized here, see van Lange et al., 2017b). The first proposition is that lower temperatures and especially greater seasonal variation in temperature influence individuals and societies to adopt a greater future orientation and enhanced self-control (Proposition 1). The second proposition is that self-control and future time orientation are important inhibitors of aggression and violence (Proposition 2).

CLASH builds on life history theory, an evolutionary theory that suggests the importance of

environmental "harshness" and "unpredictability" for the development of *fast* versus *slow* life strategies (e.g., Ellis, Figueredo, Brumbach, & Schlomer, 2009; see also Hill, 1993; Kaplan & Gangestad, 2005). Two underlying aspects of a fast life strategy are high present focus and low self-control. In contrast, two underlying aspects of a slow life strategy are high future focus and high self-control. Planning for the future and resisting temptation are intrinsic parts of a slow life strategy (Frankenhuis, Panchanathan, & Nettle, 2016). Stripped to its essentials, life history theory argues that under harsh and unpredictable environmental conditions, people tend to adopt a fast life strategy because future rewards are less likely to occur. Conversely, under less harsh and more predictable conditions, people tend to adopt a slow life strategy because future rewards are more likely to occur (Frankenhuis et al., 2016).

As we discuss in greater detail later, CLASH suggests that seasonal variation in temperature gives rise to a "planning culture," because such variation in seasons is largely predictable and to some degree "controllable" by anticipating and planning for the next season (e.g., reap agricultural crops, plan for personal safety and comfort), which are important elements to survival and reproduction.

In regions closer to the equator, the climate is warmer and less variable per season. Thus, individuals have less need to plan ahead to ensure survival and reproduction. In these regions, there is little need to focus on the future, develop a longer time perspective, or exercise self-control (Ainslie, 2013). Moreover, societies closer to the equator are also relatively "harsh" and unpredictable. Hot temperatures can be an important source of stress, not only in terms of everyday life, but also in terms of a threat to crops. Another source of harshness and unpredictability is parasite stress. Indeed, the prevalence of parasitic and infectious diseases such as malaria and the Zika virus is considerably higher in countries closer to equator (e.g., Guernier, Hochberg, & Guégan, 2004), which poses a great threat to survival and human functioning (e.g., Fincher & Thornhill, 2012; Fincher, Thornhill, Murray, & Schaller, 2008).

CLASH conceptualizes time orientation and self-control as important mediators between climate and aggression and violence. Time orientation is often conceptualized in terms of differences in present orientation versus future orientation. These differences in time orientation are strongly linked to climate (cf. Boniwell & Zimbardo, 2004). In warmer climates, people are more strongly oriented to the present, whereas in colder climates people are more strongly oriented to the future. For example, the United States and Northern European countries are clock-time cultures that focus on schedules and punctuality, whereas most Latin America countries are event-time cultures that focus on the natural flow of social events as they unfold in the "here and now" (Brislin & Kim, 2003; Levine, 2006). Consistent with CLASH, an analysis of work-related values in 40 countries found that countries located farther from the equator tend to place greater value on future-oriented rewards such as perseverance and thrift (Hofstede, 2001). Also, there is research showing similar cultural differences for patience (see Dohmen, Enke, Falk, Huffman, & Sunde, 2015).

Clearly, time orientation is related to self-control, which is generally conceptualized as the ability to resist and manage "temptations" and "impulses" (see Baumeister & Tierney, 2011; Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008). There is not much cross-national research on self-control, but there is some tentative evidence to suggest that there may be a link between self-control and climate. One example is a recent study that found higher levels of self-reported self-control in Northern European countries (e.g., Scandinavian countries, Iceland) than in Southern European countries or the United States (Botchkavar, Marshell, Rocque, & Posick, 2015). However, another study found little cross-cultural variation in self-control across 25 countries (Alonso-Arbiol et al., 2011). Clearly, future research is needed to further examine the relationship between self-control and culture, and provide a specific test of this CLASH prediction.

The final part of CLASH is that short-term orientation and low self-control predict aggression and violence. Indeed, self-control is one of the strongest predictors of aggression (e.g., Baumeister & Tierney, 2011; DeWall, Finkel, & Denson, 2011) and violence (e.g., Pratt & Cullen, 2000), including violent crime (Gottfredson & Hirschi, 1990; Henry, Caspi, Mofitt, & Silva, 1996). Indeed, several studies have linked poor self-control to serious criminal acts (Evans, Cullen, Burton, Dunaway, & Benson, 1997; Longshore, 1998), including intimate partner violence (Payne, Higgins, & Blackwell, 2010), political violence (Özbay & Kőksoy, 2009), bullying (Unnever & Cornell, 2003), and dating and gang violence (Chapple & Hope, 2003). Studies also show that "delinquents" are more likely to think about the short-term than the long-term consequences of their actions (Gottfredson & Hirschi, 1990; Pratt & Cullen, 2000). Similarly, a future orientation is negatively related to various forms of aggression (Joireman, Anderson, & Strathman, 2003; Moore & Dahlen, 2008; Zimbardo, Keough, & Boyd, 1997), including physical aggression (i.e., willingness to administer electric shocks to another person in a laboratory experiment; Bushman, Giancola, Parrott, & Roth, 2012), and past violent behaviour (Stoddard, Zimmerman, & Bauermeister, 2011). Also, there is growing evidence from experimental research that adopting future orientation can reduce norm violations (e.g., van Gelder, Hershfield, & Nordgren, 2013; van Gelder, Luciano, Weulen Krananbarg, & Hershfield, 2015).

Extensions of CLASH

CLASH generalizes across socioeconomic and political-historical variables (e.g., national wealth, democracy) as well as across climate-related circumstances that might shape human behaviour (e.g., the threat of parasites). Of course, this is not to imply that these broad classes of variables do not influence aggression and violence, nor that these variables are not relevant to CLASH. For example, some socioeconomic variables are strongly influenced by climate. Indeed, climate may often operate in concert with other key variables that might trigger intergroup hostility and aggression. As discussed by Van Lange et al.

(2017b) and outlined here, two theories, in particular, may complement CLASH in constructive ways: the climate-economic theory of freedom (van de Vliert, 2013) and the parasite-stress theory of sociality (Fincher & Thornhill, 2012).

Climate-Economic Theory of Freedom

It is also plausible that climate in combination with wealth (or specifically monetary resources) determine future orientation and self-control, as assumed in the climate-economic theory of freedom (van de Vliert, 2009, 2013). One especially relevant prediction of this theory is that monetary resources matter more in demanding climates. The rich can cope well because of their resources, and even come to view demanding climates as a welcome challenge, whereas the poor view demanding climates as a genuine threat to their survival and well-being. There is good evidence for this theory in other social domains. For example, a longitudinal study involving 123 countries found that generalized trust in strangers is determined by climate, primarily among the wealthier countries (Robbins, 2015). Another study involving 74 countries found that adults in increasingly demanding cold or hot climates value cooperative enculturation of children if their society is richer, but value egoistic enculturation if their society is poorer (van de Vliert, van der Vegt, & Janssen, 2009). These findings are in line with the climate-economic theory of freedom, and underline the importance of climate *and* wealth for issues that are linked to self-control and aggression. Thus, the climate-economic theory of freedom predicts that aggression and violence levels should be higher in countries with higher temperatures (and less seasonal variation) and low levels of national wealth. CLASH can provide a critical test of this prediction, and inform us whether this pattern would be mediated by future orientation and self-control.

Parasite-Stress Theory of Sociality

Another natural circumstance that is closely linked to high temperatures, and low seasonal variation in temperature, is the threat of parasites. Parasite stress is a concept that is most often used in reference to the threat of infectious disease, which is a major source of morbidity and mortality (e.g., Guernier et al., 2004; Schaller, 2006, 2016). According to the parasite-stress theory of sociality, humans and other animals adapt to parasite stress by adopting in-group and out-group social tactics (Fincher & Thornhill, 2012). This adaptation is selected for in the interactions with in-group members versus newcomers and out-group members. Manifestations of these tactics involve *in-group favoritism*, such as strengthening family ties. They are also expressed in participation in local group activities and customs (e.g., with features such as adherence to local traditions, norms, and dialect), as well as religion (e.g., participation in religious practices that strengthen in-group ties). Adaptations also involve *out-group dislike or avoidance*. Examples of manifestations are ethnocentrism and xenophobia, general distrust of out-group members, and tendencies that weaken ties (if they exist at all) with out-groups (Fincher & Thornhill, 2012; see also Murray & Schaller, 2016; Schaller, 2016).

Interestingly, parasite stress has also been shown to be linked to the classic cultural dimension of individualism versus collectivism (Hofstede, 2001). In contemporary societies, individualism and collectivism are strongly linked to crossing in-group and out-group boundaries. Collectivists emphasize these boundaries, and tend to distrust and avoid out-group members. In contrast, individualists are more likely to cross these boundaries, and tend to trust out-group members (e.g., Gelfand, Bhawuk, Nishii, & Bechtold, 2004). In countries with milder climates and more seasonal variation, the relative absence of parasite stress goes hand in hand with the development of individualism. As such, collectivism, which is more prevalent in warmer locations with less seasonal variation, brings about an intergroup tension that is far less intense than in individualistic countries. The present research can provide a critical test of this prediction by examining whether parasite stress is associated with
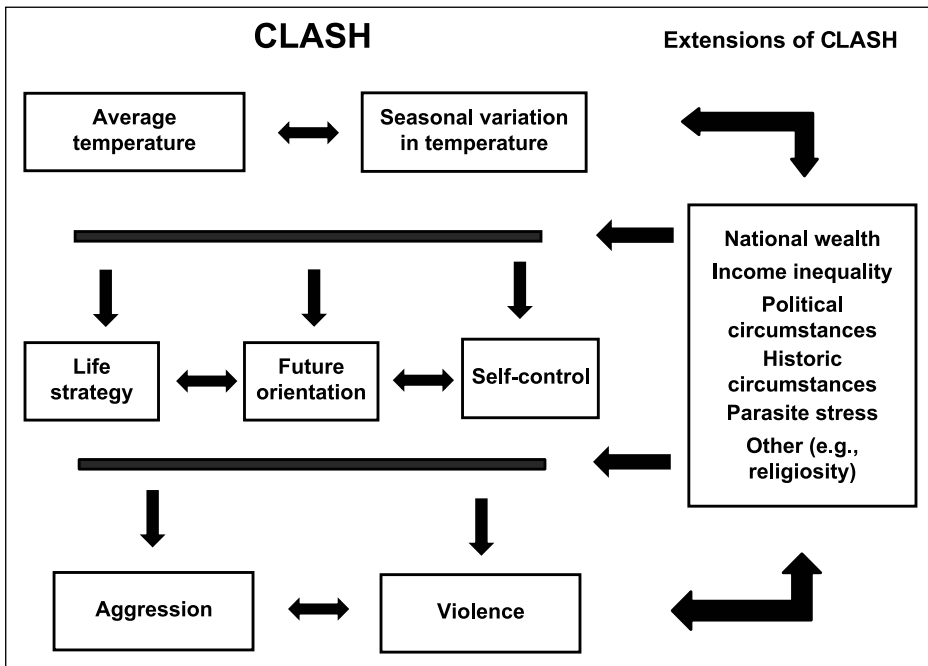
Figure 3. An extended model of Climate, Aggression, and Self-control in Humans (CLASH; adapted from Van Lange et al., 2017c).

aggression toward out-group members, and whether it completely or partially mediates the influences of climate predicted by CLASH. In addition, some studies are conducted within countries, where parasite stress is relatively weak and where it is does not covary with climate. Within-country studies can provide a critical test of CLASH while controlling for parasite stress.

CLASH and Other Key Variables

In addition to national wealth and parasite stress, there are several broad concepts related to climate that have been advanced to understand aggression and violence in society (see Figure 3). Examples include but are not limited to income inequality, trust, democracy, rule of law, market competitiveness, tight and loose cultures, and norms of civic cooperation (e.g., Balliet & van Lange, 2013; Gächter & Herrmann, 2009; Gelfand et al., 2011; Henrich et al., 2010; van Lange, 2015; Yamagishi, 2017). In addition to

wealth, income equality may be important. For example, there is strong evidence that income inequality is a powerful determinant of aggression and violence across nations (see Kenrick & Gomez Jacinto, 2013; Wilkinson & Pickett, 2009). Income inequality also tends to be greater near the equator (van de Vliert & van Lange, 2017).

Example of other possible explanatory variables include level of *democracy, market competitiveness* (set of institutions, policies, and factors that determine the level of productivity in a country; Henrich et al., 2010), and general trust (van Lange, 2015). For example, democracy and general trust in others are closely interconnected, and have been shown to be essential to understanding how small groups may maintain harmony and cooperation, rather than aggression (Balliet & van Lange, 2013). In addition, level of collectivism and religiosity are key variables that we discussed earlier as part of parasite-stress theory of sociality. However, these variables may also exert effects or associations independent of parasite stress.

CLASH and Intergroup Conflict

In extending CLASH to the domain of inter-group relations, some scholars have argued that intergroup relations are especially prone to conflict (e.g., De Dreu et al., 2010; Reinders Folmer, Klapwijk, De Cremer, & van Lange, 2012; Yamagishi & Mifune, 2009). The reason is that relative to interpersonal interactions (even among strangers), intergroup interactions are strongly affected by a hostile mindset by which individuals (a) become motivated by competition or even spite (i.e., orientated towards making their own group obtain better outcomes than the other group), and (b) come to distrust others, believing that members of the other group are similarly oriented toward competition or even spite. Evidence for such a hostile mindset is even obtained when individuals in the role of representatives interact with representatives of other groups (Reinders Folmer et al., 2012; Wildschut, Pinter, Vevea, Insko, & Schopler, 2003).

On the basis of these findings, and the larger literature on social categorization in social dilemmas and other economic games (e.g., Brewer & Kramer, 1986) and parochial cooperation (e.g., Bernhard, Fischbacher, & Fehr, 2006), there is strong reason to believe that in situations that may give rise to conflict, members of out-groups especially may threaten harmony and cooperation between out-group members (see also Parks, Joireman, & van Lange, 2013). Therefore, one way to restrain or overcome a hostile mindset for out-group members is to adopt a longer time orientation and exert self-control in interactions with out-group members, especially in situations in which out-group members may violate norms or may not be trusted. In other words, one way to restrain or overcome a hostile mindset is for individuals to adopt a future orientation and exert self-control in interactions with out-group members. Needless to say, this seems especially important when feelings of injustice are activated, or when out-group anger is activated (e.g., when out-group members show little respect for one's own group).

We suggest that classic topics in the social and behavioural sciences, such as stereotyping and discrimination, as well as entire fields (e.g.,

community psychology, international relations, peace science) should be informed by how people adapt to climate. As an example, we have recently found that football coaches are more often hired and fired in countries closer to the equator (van Lange, Bien, Rinderu, & van Doesum, 2017a). Issues regarding in-groups and out-groups are prevalent in everyday life, and therefore the future orientation and self-control relevant to these issues are clearly important to understand—scientifically and societally.

What About Intergroup Conflict and Global Change?

During the past 10 thousand years, climate has been subject to some variation but has often quickly restored balance. The most plausible reason for this stability is the fact that Earth's orbit around the Sun has not been subject to any important change (Ricard, 2015). Until recently, that is. There is consensus among climate experts that since 1950 global warming has been largely due to human activity—such as use of motor vehicles, fertilizer consumption, and livestock and waste emissions. This stability of climate before 1950 gives conceptual status to climate as cause of culture. It is unlikely that culture shapes climate, and it is also unlikely that variables closely linked to culture (e.g., wealth, income inequality, political circumstances, governance) shape climate. It is much more likely that climate shapes these variables.

However, when people think about the consequences of climate change, they "normally focus on weather, crops, islands sinking, glaciers melting, and polar bears losing their habitat" (van Lange et al., 2017c). People rarely think about how climate change might influence aggression and violence levels (Plante, Allen, & Anderson, in press). Between the years 1880 and 2015, the 16 hottest years have been the last 16 years, with 2015 being the hottest year ever (National Centers for Environmental Information, 2015). It seems reasonable to assume that temperatures are likely to increase further, whereas variation in seasonal temperatures in densely populated regions is

likely to decrease further. This is bad news for the planet, and not just for the crops either.

It is interesting to discuss the broader implications of global warming. It is likely to increase the poverty around the equator. People have already discussed poverty around the so-called equatorial Grand Canyon, a hot belt several thousand kilometers around the equator, characterized by an exceptionally large concentration of lower income countries (e.g., Landes, 1998; Parker, 2000). This hot belt will increase in size, both in northern and southern directions. Clearly, scarcity of resources can be a powerful source of intergroup conflict. Further, we witness an increase in migration, which in part may be triggered by climate change. This too may enhance intergroup hostility, because newcomers to a country tend to pose a threat—a threat to the availability of jobs, a threat of diseases, and perhaps a threat to existing culture. Clearly, these issues are central to the extended model of CLASH where wealth, income inequality, and parasite stress are assumed to be important variables.

But can the mere thought of climate change also bring about intergroup hostility and conflict? Recent research suggests that this is a real possibility. Reminding people of the adverse effects of climate change tends to bring about a stronger belief in authority—greater endorsement of leaders who punish norm violators. But more importantly, such reminders also tend to increase out-group derogation (Fritsche, Cohrs, Kessler, & Bauer, 2012). As the researchers themselves note, it is possible that people pursue a stronger psychological sense of connection with their in-group in the face of adversity caused by climate change. As we noted for climate as such, it very likely that people, both as individuals and collectives, adapt to climate change. In-group favouritism, which tends to be stronger in warmer countries with less seasonal variation in temperature (van de Vliert & van Lange, 2017) may well be an adaptive response to the climate-related threats to wealth or, stripped to its essentials: threat to survival of the self and one's offspring. It is the coping with unpredictability that is important—this may bring people together, perhaps especially members of in-groups. But still, adapting to predictable change is a key aspect that may reinforce a culture of planning, involving focus on time and self-control, which is both an individual and collective way of adapting to climate and climate-related circumstances.

More generally, if CLASH is correct, aggression and violence may move away a little bit further from the equator—to regions that are more heavily populated. One might speculate that in the future, France would become in-group oriented at a level we may see now in Southern Italy. Perhaps Northern California and Oregon will become very similar to a subculture we may witness now in Southern California. But we predict in particular that people will seek to move away from the unbearable heat. Technological solutions, such as air conditioning, have been shown to be effective. But it is the broader climate-related environment which guides variables such as wealth versus poverty (e.g., support for agriculture) and ecological circumstances (e.g., disease threat) that may help explain increases in intergroup conflict (and migration). And perhaps there is a truly independent effect of temperature and seasonal variation in temperature that will help us understand differences in culture, especially differences in a culture of planning—with a strong focus on time, self-control, or less so. Clearly, these are rather speculative thoughts, but CLASH is one of the few models in the behavioural sciences that sets climate on the agenda of human behaviour and culture.

What We Have Learned From Scientific Debates About CLASH

CLASH is a new theory and has generated considerable debate (see van Lange et al., 2017c). One reason for the debate is that CLASH is young and strongly in need of empirical research. Another reason is that a climatological approach is novel, and many scholars seem to assume that aggression and violence are due to factors other than climate (e.g., governance, economics, scarcity of resources, historic variables such as

colonization). We find this debate healthy, and we do not think these alternative theories conflict with CLASH. Indeed, climate may well be the ultimate reason for how individuals and groups cope with circumstances that are strongly shaped by climate. Next, we discuss some of the important lessons learned from the scientific debate about CLASH.

The Importance of Cultural Evolution

CLASH assumes a strong association between climate (average temperature and seasonal variation) and culture, which we broadly define as a system of enduring norms, values, beliefs, habits, and institutions shared by a large group of people and transmitted from one generation to the next (cf. Boyd & Richerson, 2009; Gelfand, 2012; Heine & Norenzayan, 2006; Henrich & Ensminger, 2014; Markus & Conner, 2013). It is important to acknowledge that climate is a relatively stable environmental feature.

Adapting to climate is perhaps as much, if not more, a collective enterprise as an individual enterprise. As noted earlier, it is especially a culture of planning that is a collective adaptation to seasonal variation in climate. CLASH proposes that it is the predictable seasonal variation in temperature that calls for planning and future orientation. In particular, individuals in these societies realize that they need to plan and prepare for the next season. For example, food supply is less plentiful and less varied during winter, posing a serious threat to health. Clearly, this calls for foresight and planning, and a sufficient degree of self-control—resisting the temptation to consume the harvest directly (Ainslie, 2013; Baumeister, Park, & Ainsworth, 2013).

What we have learned is that it is important to think of cultural evolution by highlighting the importance of how groups and collectives shape a culture to adapt to stable climatological circumstances. Cultural evolution is an ongoing process, and there must be a fair amount of flexibility to it. For example, there is some evidence for pronounced increases in general trust among those who move from low-trust societies to high-trust societies (e.g., Dinesen, 2012; see also van Lange, 2015). In other words, there is stability in the culture that adapts to climatological circumstances, but there is flexibility in individuals who become part of another culture that has adapted to other climatological circumstances.

But Aren't People Closer to Equator More Prosocial?

Some scholars have argued that people closer to the equator are more friendly and prosocial (e.g., Konrath, 2017), citing research showing that physical warmth may enhance trust and prosociality (e.g., Williams & Bargh, 2008). It may sound like a paradox, but we suggest that aggression does not exclude prosociality, trust, or closeness. It is possible that a strong sense of "in-group love" may sometimes go hand in hand with some "out-group hate," because an emphasis on collectivism and in-group favoritism tends to lead to a sharper differentiation between "us" and "them" (see also Gelfand et al., 2004; Yamagishi & Mifune, 2009).

So, what have we learned? There is indeed evidence that both tendencies—collectivism and in-group favouritism—are more pronounced in regions closer to the equator (van de Vliert & van Lange, 2017). It is possible that warmth is predictive of intergroup hostility, but with a simultaneous tendency to help those that belong to the in-group, tend to be similar to the self, or are otherwise psychologically near. Given that people often interact with in-group members in a community, even individual visitors, the common experience may be that one experiences greater warmth, trust, and prosociality in warmer countries than in colder countries.

What About the Exceptions to CLASH?

We have already noted that South Africa and Russia are examples of countries that are not close to the equator but are characterized by relatively high levels of aggression and violence. But at the level of within-country comparisons, aggression and violence levels are higher in the

south than in the north. Italy and the United States are prime examples. Southern Italy is dominated by mafia-related terror and violence, and many southern states in the US are characterized by a "culture of honor" that is often defended through aggression and violence (Nisbett, 1993; Nisbett & Cohen, 1996).

What About Exceptions at the Global Level?

A very literal, or linear, implication of CLASH is that *ceteris paribus*, most aggression and violence should occur at the equator. But that is not supported by the evidence. Instead, there is considerably more aggression and violence in warm climates than in cold climates, yet there is somewhat less aggression and violence in hot climates than in warm climates—climates with average annual temperatures that exceed 24 °C (75.2 °F), which often are located inland and very close to the equator (see van de Vliert, 2013; van de Vliert & Daan, 2017). It is possible that population density matters? Not many humans, or even other animals (including parasites), can stand the heat, either physically or because there are simply limited opportunities for building a comfortable environment in which to live.

It is also true that many people are not good at coping with exceptional cold either. But people can often protect themselves against the cold if they have the resources to do so. This may, to some degree, explain why we see higher levels of aggression and violence in northern parts of Russia (Prudkov & Rodina, 2017). It also seems plausible that people in northern parts of Russia might migrate to more southern locations if they have the resources to do so (for a further discussion, see van Lange et al., 2017c).

CLASH and Future Avenues of Research on Intergroup Conflict

Needless to say, intergroup conflict is one of the most classic topics in social psychology. A theoretical analysis such as CLASH and its extensions, which focus on climate and culture, is relatively new. Indeed, more classic approaches are realistic group conflict (Sherif, 1966; Sherif, Harvey, White, Hood, & Sherif, 1961) and theories focusing on social identity and categorization (Tajfel & Turner, 1979; for a review, see Ellemers & Haslam, 2012). None of these theories include climate in their analysis; also, culture is not a central concept either. We suggest that issues of goal conflict, identity, and categorization, are probably strongly influenced by climatological circumstances. We have already outlined that scarcity of resources may be determined by climate, and it is easy to imagine that groups in particular have realistic conflicts about resources. Such reasoning finds home in evolutionary theorizing as well, such that genetic outcomes are strongly conditioned by the groups who do better at dealing with scarcity of resources.

The need for social identity, and the way we categorize ourselves as members of a particular group, and how we define the out-groups, may be strongly conditioned by how people have individually and collectively adapted to climate or climate-related circumstances. Why is it, for example, that in-group favouritism—a classic topic in research on social identity and categorization—is stronger in locations closer to the equator (see van de Vliert & van Lange, 2017)? Is it primarily a matter of resources and realistic conflict over resources? It is possible that adverse circumstances (such as competition over scarce resources or unpredictability of parasite stress) or some positive interdependences (e.g., warmer climates fostering informal interactions, including noninstitutionalized helping and support such as child care) bind members to become one group who "fight" against the threat posed by out-groups, the threat of diseases, or to benefit from spontaneous, informal help.

In the final analysis, these are empirical issues that would energize new tests of the reach and limitations of realistic conflict theory or social identity theory. For example, in cross-national research, it could be examined whether climate, especially average temperature and seasonal variation in temperature, is predictive of thinking and acting in terms of in-groups and out-groups.

This follows from the simple CLASH model. If it is climate-related poverty and scarcity that trigger conflicting goals among groups, then realistic group conflict would be essential in the conceptual analysis of intergroup conflict. This follows from the extended CLASH model.

Perhaps the most challenging societal issues of recent times are the refugee crisis (at least in Europe) and climate change. These two issues are not independent. There is good reason to believe that the refugee crisis is in part fuelled by global warming—perhaps along with the prospect of more global warming in the future. An intriguing issue for future study would be to examine whether cultural differences in planning continue to exist. For example, will people from locations with less seasonal variation in temperature become more concerned with time as they move to locations with greater seasonal variation in temperature? Also, how do people deal with dual identities after migration? For example, do immigrants from Turkey who live in Germany feel Turkish, German, or both? It is possible that many feelings related to the past—nostalgia—are also climate-related (e.g., "it was so nice to be outside all the time") and are central to their identities. It is useful to recognize that many aspects of everyday life are linked to climate—what clothes we wear, whether we expect it to rain, how much time we spend outdoors versus indoors. The recognition of climate-related differences might be helpful to understand some differences in culture. And given that climate differences are stable and pervasive, it makes sense that immigrants to a new country need time to adjust to climate differences, as well as the host of psychological variables that are linked to climate, such as differences in time orientation. Needless to say, these are important topics in an era of migration, an era of climate change, and an era in which the world becomes smaller and smaller.

Concluding Remarks

There is evidence that aggression and violence are decreasing, and we may be living in a relatively more peaceful time (Pinker, 2011). Still, the media show us nearly every day inexplicable forms of aggression and violence; these are often rooted in conflict between groups rather than individuals and they often occur in regions with warmer climates with less seasonal variation. As the quote from Dorothy Thompson at the beginning of this article noted, creative solutions are needed to solve conflict, aggression, and violence. We believe that creative theories and models are also needed. This is why we proposed CLASH.

CLASH has been a journey for us. While on this journey, we increasingly realized how big the topic of climate and culture evolution is. It was a journey where, at the beginning, we did not make a clear distinction between weather and climate (see Rinderu, Bushman, & van Lange, 2018), we did not make a clear distinction between proximal and ultimate mechanisms (see van Lange et al., 2017b), and we did not fully acknowledge that climate represents a pervasive, stable feature of the natural environment (see van Lange et al., 2017c).

Also, we increasingly realized that individuals are interdependent in adapting to climate. People can help one another in facing the challenges of climate, they may individually and collectively plan for the future, and the informality and spontaneity of social interactions may strongly be shaped by climate. The notion of a *planning culture* seems largely a group-based adaptation to climate, and it may have implications for the services and products that are linked to long-term concerns or even worries (e.g., insurance products, mortgages), and more broadly for how strict and tight a society should be organized and governed in terms of rules, contracts, and institutes. Such speculations are interesting to us, and could inform novel programs of research. Indeed, the implications of a planning culture are strong and diverse, influencing many behaviours that people exhibit or habits that people develop and sustain.

We do not think that climate should be put to a competitive test with other, more proximal variables that influence aggression and violence. Although competitive testing is a natural inclination of many scientists, in the natural world individuals *and* groups adapt to stable features of the

environment. Climate is clearly one of these stable features, perhaps the most stable of all, especially prior to 1950. Many other variables, from poverty to migration, from colonization to parasite stress, and from income inequality to governance, are likely to vary as a function of climate. Even if psychology is only one of the disciplines explaining the consequences of climate for society and culture, we believe psychology can make a unique and important contribution. We hope CLASH can help to make a creative and important contribution to understanding and reducing the level of conflict, aggression, and violence in the world, especially between groups. Creative solutions are required because our planet has a fever, and is getting hotter and hotter over time.

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