

# The decline of cooperation, the rise of competition: developmental effects of long-term social change in Mexico

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Using Greenfield's theory of sociocultural change and human development as a point of departure, we carried out two experimental studies exploring the implications of decades of globalised social change in Mexico for children's development of cooperation and competition. In rural San Vicente, Baja California, the baseline was 1970 and the historical comparison took place 40 years later. In Veracruz, the baseline was 1985 and the historical comparison took place 20 years later. In Veracruz, children were tested in both rural and urban settings. We hypothesized that cooperative behavior would decrease in all three settings as a result of the sociocultural transformations of the past decades in Mexico. The Madsen Marble Pull Game was used to assess cooperative and competitive behavior. As predicted by Greenfield's theory of social change and human development, the Marble Pull procedure revealed a striking decrease over time in levels of cooperative behavior, with a corresponding rise in competitive behavior, in all three settings.

**Keywords:** Cooperation; Competition; Globalisation; Rural; Urban; Social change; Culture; Cultural evolution; Child development; Social development.

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This report explores theory-driven hypotheses linking ecological and developmental change. Two studies extend Greenfield's (2009) theory of social change and human development to the domain of cooperative and competitive behavior. The overarching thesis is that human development is not constant across historical time, but changes as a function of changes in the sociodemographic environment. However, it is rare to have experimental data to detect behavioral change over a period of decades. Greenfield, Maynard, & Childs (2003) used an experimental procedure to trace changes in children's cognitive development over a period of two decades. (In this special section, Maynard, Greenfield, & Childs, (2015) add two more decades to their cross-temporal study of cognitive development.) To our knowledge, these studies are the first experiments to trace changes in

children's social development over such a long time span. The cross-temporal comparison of Experiment 1, moreover, covers a span of 40 years, one of the longest on record for experimental behavioral data. The significance of the cross-temporal comparisons reported here is that they were carried out in Mexico during a period of extraordinarily rapid social change in economic development, educational infrastructure and communications technology.

A central theoretical claim of Greenfield's (2009) theory is that different value systems, behaviors and developmental trajectories are adapted to different types of ecology. The ecological level of the theory is based on the ideal types of *Gemeinschaft* (community) and *Gesellschaft* (society) (Tönnies, 1887/1957). *Gemeinschaft* communities are rural, culturally and ethnically

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C. Garcia designed the studies, participated in data collection, input the data into Excel and co-wrote the first draft. N. Rivera participated in data collection, developed preliminary results and co-wrote the first draft. P. M. Greenfield did the statistical analysis in SPSS and drafted the submitted manuscript. This article is dedicated to the memory of Millard Madsen, with heartfelt gratitude from his last student, Camilo Garcia. Many thanks to the students of the Laboratory of Social Interaction, Veracruz University, whose efforts and participation made possible data collection in 18 communities (particularly to Esteban Jaimes Cortés for his his tireless efforts in San Vicente). Our special gratitude to Dr. Ricardo Corzo Ramirez, member of the Board of Trustees, Veracruz University, for his continuous support to our Laboratory. Many thanks to the Totonaco and San Vicente communities, especially their school administrators, teachers and participating students, for their contributions to our scientific understanding of Mexican social development. Finally, our acknowledgement to Mr. Henri Souhart and his family, and to Marc Teuscher, for their generous contributions to this project from its inception to this endpoint.

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homogenous and relatively isolated; they have subsistence economies, simple technology and are relatively poor (cf. Inglehart & Baker, 2000). Education takes place at home around practical skills. *Gesellschaft* societies, in contrast, are urban, culturally and ethnically heterogeneous and connected to the outside world; they have commercial economies, complex technology and high levels of wealth. Education centres on school and the development of the mind. In line with the focus on formal education of each child, family size decreases.

Cooperation is a behavior that is adaptive in a *Gemeinschaft* environment. For example, subsistence requires that people work together in complementary ways to supply their families with food, clothing and shelter. Competitive behavior, by contrast, is adaptive in a *Gesellschaft* environment. For example, where educational attainment is necessary for occupational success and educational opportunities are limited, competition in the educational sphere is required to succeed. At the next level, the theory posits that learning environments are adapted to the sociodemographic ecology and these learning environments then socialise the type of behavioral development that is adaptive in that particular ecology. In a subsistence economy, children are taught informally at home to cooperate to fulfill family needs. In a commercial economy, children are taught that, in school, cooperation is punishable as cheating (Whiting & Whiting, 1973) and that, instead, they must compete to advance their education and careers. Children's developmental trajectories then reflect these learning environments and socializing influences. In line with this analysis, prior research had demonstrated that rural children were more cooperative than urban children in Korea (Madsen & Yi, 1975) and New Guinea (Madsen & Lancy, 1981). Ecologically driven differences are visible as early as middle childhood (Madsen, 1971).

Because cooperation and competition are adapted to sociodemographic ecologies, Greenfield's theory posits that they are subject to modification under changing ecological conditions. When any sociodemographic dimension moves in the *Gesellschaft* direction—for example, urbanization, increased wealth, technology or availability of formal education—the theoretically based prediction is that behavior will become more competitive and less cooperative. This prediction was tested by two studies of children's cooperative and competitive behavior in Mexico.

The use of *Gemeinschaft* and *Gesellschaft* as paradigms represents the patterning of ecological variables to make a complete environment. In this respect, the theory of social change and human development differs from the dominant paradigm in psychology, which seeks to “disentangle” variables. In contrast, the viewpoint here is that ecological factors operate synergistically and interactively, not in isolation. However, different ecological factors are drivers of behavioral change at different times;

according to what ecological variable is changing most rapidly in a given period, in a given location.

The goal of this research was to demonstrate that, as Mexico has moved in the *Gesellschaft* direction in recent decades, cooperative behavior has declined and competitive behavior has increased. This hypothesis is tested by cross-temporal experiments with communities in different regions of Mexico over a period of two decades (Experiment 2) and four decades (Experiment 1). Because prior evidence has indicated that cultural differences in cooperation and competition arise by middle childhood, we focus on this developmental period.

### EXPERIMENT 1: NUEVO SAN VICENTE, BAJA CALIFORNIA, MEXICO

This experiment took place in Nuevo San Vicente, located 54 miles south of Ensenada in the Mexican state of Baja California. Major sociodemographic changes occurred in San Vicente between 1970 and 2010. All of these sociodemographic changes went in the *Gesellschaft* direction, leading us to predict reduced cooperative behavior in children in 2010, compared with 1970.

#### Nuevo San Vicente in 1970 and 2010

According to Madsen (1971), the economy in 1970 was largely agricultural and the population only 800. The majority of the houses utilised very simple construction methods; many, in fact, had dirt floors. The supply of drinking water was insufficient, few houses had electricity, and there were no indoor bathrooms or municipal services such as garbage collection.

By 2010, San Vicente had become more urban: Population had increased from the 800 noted by Madsen to 4362 (2010 Mexican census—INEGI, 2010). Agricultural work had been largely replaced by commercial activity. Family size had decreased. Summer migration to the United States for farm work made San Vicente much more connected to the outside world, as did the coming of the Internet. There were other important technological developments: House construction was noticeably suburban in style; dirt floors had disappeared. The community has basic municipal services, such as drinking water and electricity, satellite TV and telephone service. As in much of Mexico, cell phones had been introduced and were extremely popular. Remittances, as well as the importation of money by seasonal workers in the United States, had become an important and stable source of community income. While there are no data on this point, it is a logical conclusion that this source of income had increased the wealth of the town as a whole. Seasonal workers also imported material culture from the United States every year—such as computers, cameras and small

household appliances. The town became culturally heterogeneous with the introduction of Protestant churches in the originally Catholic community. The ethnic composition also became more heterogeneous as multiethnic migrants, unable to cross the border into the United States, settled in San Vicente. All of these changes pushed Nuevo San Vicente in the *Gesellschaft* direction.

## Method

By means of an experimental task, this study examined cooperative and competitive behavior at two points of time 40 years apart. This is a rare cross-temporal research design, ideally suited to studying the impact of social change on human behavior.

Madsen (1971) reported the early wave of San Vicente data in 1970. The first and second authors traveled to San Vicente in 2010 to replicate the same experiment. The goal was to test the hypothesis that cooperative behavior would decline as competitive behavior increased, because of San Vicente's movement from a more *Gemeinschaft* to a more *Gesellschaft* environment.

## Participants

The 1970 sample consisted of the participants in Madsen's study (Madsen, 1971). There were 10 pairs of 7–8 year olds and 10 pairs of 10–11 year olds. Each group was evenly divided between boys and girls. The 2010 sample consisted of 21 pairs of 7–8 year olds and 23 pairs of 10–11 year olds. Madsen had tested all available children. However, because of ~~the sociodemographic changes outlined earlier~~—notably population increase and increased emphasis on education—many more children were available. A total of 44 pairs of young children were randomly selected and divided in four groups by age and sex: boys 7–8 years old (13 pairs) and 10–11 years (11 pairs); girls 7–8 (8 pairs) and 10–11 (12 pairs). In both generations, all of the children attended elementary school. Because of the sociodemographic changes already described, the 2010 students had heterogeneous ethnic and socioeconomic backgrounds.

## Apparatus

Madsen's "Marble Pull" was used for both waves of data collection (Madsen, 1971). The "Marble Pull" (Figure 1) consists of a rectangular wood table (43 cm high, 15 cm wide and 62 cm long). On the table is located a plexiglass (2010) or wood (1970) marble holder. The holder is comprised of two equal parts joined by a magnet. The back of each part has a string that allows the participants move the holder to the extremes of the table. If the participants pull the string at the same time (competitive response), the holder is separated and the



**Figure 1.** Exact copy of the marble pull used in Madsen, 1971. Photo courtesy of the Laboratory of Social Interaction, Veracruz University.

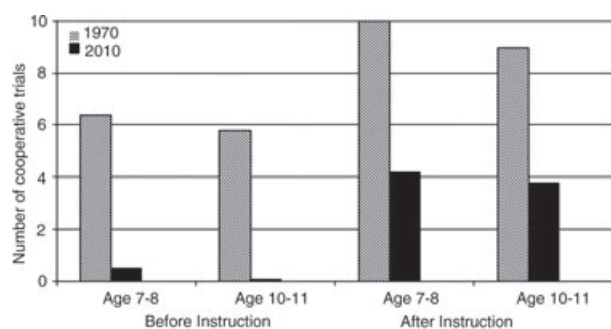
marble rolls into a groove along the edge of the table. If one participant pulls and the other releases, the marble drops into one of the cups located in each extreme of the marble pull and "belongs" to one of the children (cooperative response).

## Design, task and procedure

The design was to compare San Vicente children of the same ages and the same school in the same "Marble Pull" game in 1970 and 2010. The "Marble Pull" game was structured so that cooperative behavior was functional in terms of obtaining rewards, whereas competitive behavior was dysfunctional.

Children were randomly assigned into pairs. Pairs of children of the same sex and from the same age group were located face-to-face, one at each end of the "Marble Pull." The children sat in small chairs in the first wave of data collection; they knelt on the floor in the second wave. In both waves of data collection, participants were informed about the purpose of the study: they were to play a game in which they could get marbles. At both time periods, participants were instructed that they were not allowed to communicate either orally or by gesture. The experimental task had two parts. In the first part, the experimenter put a marble in the holder and moved it until the marble dropped into first one child's cup and then the other child's cup. The children were informed that they could keep the marbles that dropped into their cup and that they would play for 10 marbles. They were not told that the marble holder would break apart if they pulled simultaneously. At the beginning of each trial, the researcher placed a marble in the holder and said "go." When the marble holder broke and the marble rolled into a groove, the marble was removed and the experimenter informed to the children that neither one would get the marble because it did not drop into a cup (Madsen, 1971).

The second part of the experimental task followed a uniform set of instructions. First the experimenter asked the participants: "if you wanted to get more marbles into your cup, how could you do it?" Next, the experimenter



**Figure 2.** Reduction in cooperation from 1970 to 2010 in San Vicente, Baja California: Number of cooperative trials out of 10.

instructed first one child (one trial) and then the other (a second trial) to drop their string and allow the other child obtain the marble. Then, the pair continued the experimental task with 10 additional trials just like the first 10 (Madsen, 1971).

In study 1, we did not have the original data available because Millard Madsen had passed away decades earlier. We therefore used a nonparametric statistic, the binomial test, to assess the overall significance of the difference in cooperative behavior between the 1970 and 2010 data.

## Results

Figure 2 presents the results. As predicted, cooperation decreased between 1970 and 2010; correspondently, competition increased. While instructions improved children's cooperation at both ages and at both historical periods, the difference between the two generations of children persisted across both conditions (Figure 2). Given that Madsen (1971) had found no differences between boys and girls and that none were found in 2010, we inferred that the historical difference held across both genders. In order to test the statistical significance of this pattern, we carried out a nonparametric binomial test with eight groups (two age groups  $\times$  two conditions  $\times$  two genders) to assess the statistical significance of the historical decrease in cooperative behavior and increase in competitive behavior. Assuming that chance level of a historical change in one direction or another would be .5, the probability of all eight groups showing the same pattern of historical change by chance is .004.

## EXPERIMENT 2: VERACRUZ, MEXICO

Experiment 2 replicated Experiment 1 in a new geographical area of Mexico; it also added a rural–urban contrast to the historical research design of Experiment 1. In Experiment 2, the earlier wave of data (1985) was collected by the first author; therefore, unlike Experiment 1, original data were available for both time periods, making possible parametric statistical comparison.

## Veracruz in 1985 and 2010: sociodemographic change in rural and urban areas

The rural areas consisted of 15 indigenous Totonaco villages in the state of Veracruz, a mountainous state located on the Gulf of Mexico. These villages are all located on the road followed by the first Spanish conquerors. The urban areas were Xalapa and Papantla, two medium-sized Mexican cities in the same state.

Between 1985 and 2005, population increased in both rural and urban areas of the state. In both village and city, outmigration increased to the United States, augmenting remittance income from U.S.-based migrants throughout the state of Veracruz. After the North American Free Trade Act (NAFTA) went into effect on 1 January 1994, consumer goods such as home appliances and cars became available in both city and village. Television was already available in the urban centres in 1985; by 2010, it had become available in rural areas. At the same time, the agricultural way of life in the rural areas, based on the cultivation of coffee, lost its viability, because of a more than 50% drop in coffee prices.

*Hypothesis 1.* All of these developments pushed the overall ecology in the Gesellschaft direction. Once again, the hypothesis was that children's cooperative behavior would therefore decline from 1985 to 2005, while their competitive behavior would increase.

*Hypothesis 2.* The second hypothesis, based on the fundamental concept of cities as Gesellschaft environments and rural environments as Gemeinschaft environments, was that, across time periods, rural children would be more cooperative in their behavior and urban children more competitive.

*Hypothesis 3.* Because only the rural areas experienced the effects of the drop in coffee prices and the introduction of television (because the cities already had TV), social change was more drastic in rural than in urban areas. The hypothesis that behavioral change would be greater in the rural than in the urban areas therefore followed.

## Method

Apparatus and procedure were exactly as described for Experiment 1. The only task difference was that the game was limited to 10 trials, and no instructions were given.

## Participants

All participants were between 7 and 11 years old. In 1985, 58 rural pairs and 60 urban pairs participated in the experiment. In 2005, 90 rural pairs and 99 urban pairs participated. All participants were male; it would have been awkward and outside cultural norms for a male

researcher to work with girls in the villages. Because the Totonaco villages were so small, the rural sample came from 15 different villages. The urban sample came from several schools in Xalapa and one school in Papantla. The increase in the number of participants resulted from going back to the same schools where the first author had tested the original 1985 participants and, once again, testing all available children. Because of the sociodemographic changes outlined earlier—notably population increase and increased emphasis on education—many more children were available.

## Results

All three hypotheses were confirmed by the results of a two-way analysis of variance, with year and rural–urban residence as independent variables and number of cooperative trials as dependent variables. All results pertaining to the three hypotheses are graphed in Figure 3.

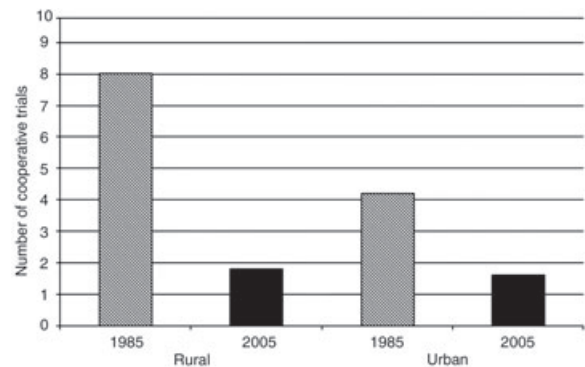
*Hypothesis 1.* As predicted, children tested in 2005 were significantly less cooperative than children tested in 1985,  $F(1, 303) = 154.89, p = .000; d = 1.32$ , a large effect size (Cohen, 1988); Cooperative trials:  $M(1985) = 6.15$  out of 10 trials ( $SD = 4.29$ );  $M(2005) = 1.53$  out of 10 trials ( $SD = 2.44$ ). Correspondingly, children tested in 2005 were significantly more competitive than those tested in 1985.

*Hypothesis 2.* As predicted, rural children were significantly more cooperative than urban children  $F(1, 303) = 21.02, p = .000; d = .40$ , a small to medium effect size (Cohen, 1988). Cooperative trials:  $M(\text{rural}) = 4.11$  out of 10 trials ( $SD = 4.06$ );  $M(\text{urban}) = 2.55$  out of 10 trials ( $SD = 3.74$ ). Correspondingly, urban children were more competitive than rural children.

*Hypothesis 3.* As predicted, rural children showed the greatest decline in cooperative behavior. This difference between rural and urban children in rate of change is demonstrated statistically by a significant interaction between year and place of residence  $F(1, 303) = 6.01; p = .015$ . Urban children went from a mean of 4.87 cooperative responses out of 10 trials ( $SD = 4.42$ ) to a mean of 1.15 cooperative responses out of 10 trials ( $SD = 2.35$ ), a drop of about two cooperative responses out of 10 ( $d = 1.05$ ), a large effect size (Cohen, 1988); in contrast, rural children went from a mean of 7.48 cooperative responses out of 10 ( $SD = 3.74$ ) to a mean of 1.94 ( $SD = 2.48$ ), a drop of about 5.5 cooperative responses out of 10 ( $d = 1.75$ , an even larger effect size).

## GENERAL DISCUSSION

As predicted, a quasi-experiment revealed that the transformation over time from more *Gemeinschaft* to more



**Figure 3.** Cooperative behavior in rural and urban areas of Veracruz, Mexico in 1985 and 2005: Number of cooperative trials out of 10.

*Gesellschaft* environments changed children’s behavior from more cooperative to more competitive. This change was manifest in rural Baja California, rural Veracruz and urban Veracruz, the three Mexican environments studied. Corresponding to more rapid environmental change, behavior change was more dramatic in rural than in urban Veracruz. Many of these environmental shifts, such as population increase and the loss of agricultural activity, bespoke the fact that rural environments were becoming more urban in character. Presumably the intervening variables mediating between macro-environmental change and behavioral change are children’s socializing experiences and proximal environments.

As predicted, children living in more *Gemeinschaft* rural environments were more cooperative, while children living in more *Gesellschaft* urban environments were more competitive in their behavior. Comparison of socialization processes in rural and urban environments may, in the future, shed light on how children’s socializing environments have changed over time.

These studies are important because, along with a growing body of work by Twenge and colleagues in social psychology (Twenge, Campbell, & Gentile, 2012; Twenge & Foster, 2010; Twenge & Im, 2007; Twenge, Konrath, Foster, Campbell, & Bushman, 2008), they suggest that our findings in psychological research are often historically contingent—that historical time is a new variable that psychology must take into account. Our data point to a new role for “replication”: not to show that results can be duplicated, but to reveal effects of sociodemographic change in the intervening years between original and replicated procedure. Conversely our findings and their theoretical context imply that lack of replication may stem from sociodemographic change, rather than from methodological weakness.

## Limitation

As noted earlier, ecological factors operate synergistically and interactively, not in isolation. However, different

ecological factors are drivers of behavioral change at different times, according to what sociodemographic feature is changing most rapidly in a given time and place. However, the design of these two studies does not enable us to explore the role of individual sociodemographic factors. However, other studies in this special section do (Manago, 2015; Maynard, Greenfield, & Childs, 2015; Weinstock, 2015; Zeng & Greenfield, 2015).

### Summary and Implications

These empirical findings provide evidence for Greenfield's theory of social change and human development in a new behavioral domain, children's development of cooperative and competitive behavior. Our experimental results demonstrate that human development in a fast-changing world can be understood only through integrating micro and macro levels of analysis. This cross-level integration also requires interdisciplinary integration—that is, the integration of psychology's individual perspective with sociology's societal perspective and anthropology's cultural perspective. The results also demonstrate that human development and behavior are not constant over time, but need to be understood in historical perspective, most especially in a fast-changing world.

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