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A Sociological Analysis of the US-China Competition in Advanced Technologies: An Illustration Using the Theory of Strategic Action Fields with the Next-Generation Automobile Industry

Seio Nakajima
Waseda University

Abstract

To fully understand the prospects for US-China technological competition, we need to examine how the economy is complexly “embedded” (Granovetter, 1985; Polanyi, 1944) within the broader context of society, culture, politics, and international relations. This paper focuses on the theory of strategic action fields (SAF) (Fligstein and McAdam, 2011, 2012). The SAF theory was used to disentangle the complexity by investigating the case of advanced technologies in the next-generation automobile industry—for example, autonomous driving and electric vehicles—for two reasons. First, the technologies required for the next generation of automobiles span most, if not all, of the advanced technologies that are the source of recent US-China tension. Second, although the two superpowers are key players in the industry, Japan is equally competitive in the global industry (both with automakers such as Toyota, Nissan, and Honda as well as parts companies such as Denso). In sum, focusing on the next-generation automobile industry enables us to look *beyond* state-to-state relations between the US and China in the area of advanced technologies.

1. Introduction

Social scientific approaches to economic phenomena have often emphasized the “embeddedness” of the economy within the broader society, culture, and politics (Granovetter, 1985; Polanyi, 1944). Over the past twenty-five years or so, renewed interest in analyzing the embeddedness has appeared broadly in two disciplines: one in political science and international relations and the other in sociology.

With the heightening tension between the United States and China over the development of new technologies, the concept of economic statecraft is gaining popularity in political science



and international relations (for example, Kapstein and Baldwin, 2020). Although this paper argues for incorporating some elements of the economic statecraft perspective, such as the important roles of laws and regulations in shaping the development of new technologies, I contend that this approach at times overemphasizes the dependence of the economy on politics and international relations, whether descriptively or normatively, and views the technological competition often in zero-sum terms between the two nations.

Alternatively, I observe that technological competition cuts across national borders and has a much more complex configuration of actors. For example, the US is strengthening regulatory controls on the exports of and investments in advanced technologies under the aegis of the National Defense Authorization Act (NDAA) and its constituents: the Export Control Reform Act (ECRA) and the Foreign Investment Risk Review Modernization Act (FIRRMA). These regulatory controls affect not only the two superpowers, the US and China, but also the “middle power” (Fels, 2017) countries and regions in the Asia-Pacific including Japan, Taiwan, and South Korea. Further, these regulations affect not only the nation-states and companies within them, but the transnational companies whose activities cut across national borders.

For example, in the area of AI technology, an increasing number of Japanese companies conduct research and development (R&D) in the United States (for instance, the Toyota Research Institute). If these companies intend to manufacture products and/or provide services in China using AI technologies, they will be potential targets of the US regulatory controls originally intended to address Chinese competition. In other words, since companies now operate in a transnational environment, the two-country relations between the US and China could significantly impact the industrial development of middle power countries, including Japan. Moreover, because the operations of industrial companies transcend national borders, US-China relations today cannot be fully grasped without examining the multilayered networks of companies and industries that may or may not follow the perimeters of the nation-states. Put another way, supply chains and investment structures in industrial production add extreme complexity to the “trade war” between the US and China.

In this context, another approach that captures the embeddedness of economy in society is useful: the theory of strategic action fields (SAF) presented by the sociologists Neil Fligstein and Doug McAdam (Fligstein and McAdam, 2011, 2012) (see also, Adler-Nissen, 2012; Cohen, 2018; Lechner and Frost, 2018). The SAF theory argues that society (including nation-states) is differentiated by a number of relatively autonomous “fields” (for example, artistic, religious, scientific, political, and economic) that are interrelated and nested (for example, politics influences industrial development). The next-generation automobile industry is a particularly interesting case as it cuts across multiple fields: national security grounded on the idea of political



power, science based on advanced technologies that are founded on scientific “truth,” and the economy based on industrial development and corporate strategies using the logic of economic profit. By applying the SAF theory, I argue that overemphasizing the political field— military and security issues as well as state actors, as is often the case in the economic statecraft approach— could prevent us from seeing the complex components and interactions that make up the technological competition.

In this paper, the complexity of US-China relations is disentangled by discussing the case of advanced technologies in the next-generation automobile industry¹ (for example, autonomous driving and electric vehicles) for two reasons. First, the technologies required for next-generation vehicles span most, if not all, of the advanced technologies that are the sources of the recent US-China conflict. Second, although the two superpowers are key players in the industry, Japanese automakers such as Toyota, Nissan, Honda and parts companies such as Denso, as well as Taiwanese automobile parts and related ICT companies, are equally competitive actors in the global automobile industry. In sum, focusing on the next-generation automobile industry enables us to see *beyond* state-to-state relations in the international relations between the US and China in the area of advanced technologies.

As a preliminary step toward a full mapping of inter-field relations within the US-China relations, this paper clarifies the potential for applying the SAF theory by selectively introducing empirical examples from the next-generation automobile industry. The seven “central elements of the theory” are followed in this paper: 1) strategic action fields, 2) incumbents, challengers, and governance units, 3) social skill and the existential functions of the social, 4) the broader field environment, 5) exogenous shocks, mobilization, and the onset of contention, 6) episodes of contention, and 7) settlement (Fligstein and McAdam, 2012, pp. 8-23).

The structure of this paper: In the next, second section, there is a brief introduction of the theory of SAF focusing on the seven central elements. The third section illustrates the utility of the theory by selectively introducing empirical examples from the next-generation automobile

¹ Next-generation vehicles have been defined as vehicles that reduce or completely do away with carbon dioxide (CO₂) emissions. In 2010, for example, Japan’s Ministry of Economy, Trade and Industry (METI) announced its Next Generation Vehicle Strategy, intended to reduce CO₂ emissions and to tackle the problems of global warming and the limited supply of natural resources, including oil (Jisedai Jidōsha Senryaku Kenkyūkai, 2010). The METI strategy designated hybrid, electric, plug-in hybrid, fuel cell, clean diesel, compressed natural gas, and other environmentally friendly vehicles as next-generation vehicles. This narrower definition has the merits that it allows us to focus on the environmental impact of vehicles. In this paper, however, I define the next-generation automobile industry more comprehensively by including such technologies as autonomous driving—in addition to environmentally friendly technologies, such as electric vehicles (EVs)—in order to fully grasp the increasingly complex trends in the automobile industry.



industry. The fourth section discusses the academic contributions of applying the SAF theory to the US-China trade conflict, in particular the utility of the SAF theory in rethinking the concept of the state in international relations. The fifth section briefly discusses policy implications of the academic analysis presented in this paper.

2. Theory of Strategic Action Fields

The theory of strategic action fields has been presented at the crossroads of studies by “economic sociologists, institutional theorists in both sociology and political science and social movement scholars” (Fligstein and McAdam, 2012, p. 3). It attempts to provide a generally applicable theory of meso-level social orders, or what the authors call strategic action fields (Fligstein and McAdam, 2011, p. 2). This generalizability is achieved through the reconstruction of the theoretical problem as understanding “collective strategic action” of “*any* institutional actor in modern society” (Fligstein and McAdam, 2011, p. 2; emphasis original).

When theories are pitched at a relatively high level of generalizability, they at times become an abstract “grand theory” (Mills, 1959, pp. 25-49, “2. Grand Theory”) that has limited applicability to real-world social phenomena. In the case of the theory of SAF, however, it has been applied to diverse empirical topics including, for example, sustainable energy (Heiskanen, Apajalahti, Matschoss, Lovio, 2018; Kungl and Hess, 2021), financialization (Modell and Yang, 2018), the disability rights movement (Petticchio, 2013), media policy (Steen-Johnsen, Sundet, and Enjolras, 2019), and cultural consecration in cinema (Nakajima, 2019a). This is because the theory of SAF provides empirically testable propositions and concrete methods, not simply a general abstract framework, for analyzing real-world phenomena (Fligstein and McAdam, 2012, pp. 164-199, “Chapter 6: Methodological Considerations”).

As Fligstein and McAdam admit, the SAF theory builds on a number of existing approaches, including Pierre Bourdieu’s field theory, Anthony Giddens’ structuration theory, institutional theory in political science and sociology, and network analysis, but adds new insights and presents critique on certain aspects of the existing arguments (Fligstein and McAdam, 2012, pp. 23-31). One example of such new insights is the role of agency of individual and collective actors in the process of the emergence and transformation of fields (Fligstein and McAdam, 2012, pp. 28-29). In order to better analyze this aspect, the SAF theory presents the concept of “social skill,” as I detail below. In particular, for the purpose of analytically disaggregating international relations between the US and China, this insight on “microfoundations” (Fligstein and McAdam, 2012, pp. 34-56) is essential, and hence, I will discuss this element in some detail in this paper.

Another new insight the SAF theory brings in is the focus on inter-field relations; even when we zero in on a single field, analysis of how this field relates to other fields is essential. For



example, Doug McAdam's (McAdam, 1999, xix-xxi) work has highlighted the importance of the broader field environment by arguing that the influence of international relations between the US and the Soviet Union during the Cold War had an important impact on the domestic socio-political dynamics of the Civil Rights Movement in the United States. Similarly, I would argue that incorporating the insight on inter-field relations—say, between the national security field and other related fields such as the field of higher education or the field of science—is essential in order to better understand the US-China competition in emerging technologies. Due to space constraints, I will not be able to comprehensively examine all the inter-field relations relevant to the field of the next-generation automobile industry. However, in the third section, I will introduce one interesting example of inter-field relations and their ripple effects in the case of the invention of a new type of magnet that can be used for motors in electric and hybrid cars.

As mentioned, the theory of strategic action fields consists of seven key elements (Fligstein and McAdam, 2012, pp. 8-23). First, strategic action fields are defined as follows:

A strategic action field is a constructed mesolevel social order in which actors (who can be individual or collective) are attuned to and interact with one another on the basis of shared (which is not to say consensual) understanding about the purposes of the field, relationships to others in the field (including who has power and why), and the rules governing legitimate action in the field. A stable field is one in which the main actors are able to reproduce themselves and the field over a fairly long period of time.

(Fligstein and McAdam, 2012, p. 9)

Second, the conceptual categories of “incumbents” and “challengers” correspond to relatively powerful and less-powerful actors (whether individual or organizational) in the strategic action field. Incumbents tend to hold on to the dominant logic of the field, while challengers tend to have somewhat alternative, at times oppositional, logic. Internal governance units are formal organizational actors “that are charged with overseeing compliance with field rules” (Fligstein and McAdam, 2012, pp. 13-14). Trade associations in different industries could be an example of these units.

The third concept is social skill. According to Fligstein and McAdam, strategic action is defined “as the attempt by social actors to create and sustain social worlds by securing the cooperation of others” (Fligstein and McAdam, 2012, p. 17). As the authors readily admit, this concept is similar to Bourdieu's concept of habitus or Giddens's view of routine action to avoid ontological insecurity, or what they term “the existential function of the social” (Fligstein and McAdam, 2012, p. 18). As they “emphasize that social skill is the idea that people want to



produce collective action by engaging others” (Fligstein and McAdam, 2011, p. 7), in my reading, their concept of social skill is akin to the conceptualization of social action in American pragmatist traditions. In pragmatism, routine, habitual actions are emphasized, but contingency and creativity of action are emphasized much more than, say, Bourdieu’s notion of habitus. According to the notion of habitus, the goal of action is to subconsciously enhance the actors’ positions within a given structure of social space (Gross, 2002, pp. 53-54). In American pragmatism, in contrast, there are no strict distinctions between goals and means of action, and it emphasizes the creative discovery of the lines of action (even the change of goals) (Whitford, 2002) as they pragmatically engage in strategies of action (Swidler, 1986, pp. 276-277).

The fourth component of the theory of strategic action fields, “the broader field environment” (Fligstein and McAdam, 2012, p. 18), consists of a number of fields outside the field in question, which embeds a certain field. The nature of these outside fields can be characterized by the distinction 1) between distant and proximate fields, 2) vertical and horizontal fields representing a hierarchical order of authority between fields, and 3) state and nonstate fields (Fligstein and McAdam, 2012, pp. 18-19).

The fifth component of the theory, “exogenous shocks, mobilization, and the onset of contention,” can be characterized by three mechanisms (Fligstein and McAdam, 2012, pp. 19-21): 1) “[t]he collective construction/attribution of threat or opportunity,” a process in which actors in the field see some opportunity or threat to the status quo of the field; 2) “social appropriation,” a process of mobilizing resources at the organizational level; 3) “innovative action” or a creative improvisational action taken by socially skilled actors to violate the rules existing in the field.

The sixth component, “episodes of contention” (Fligstein and McAdam, 2012, pp. 21-22) “can be defined as a period of emergent, sustained contentious interaction between ... [field] actors utilizing new and innovative forms of action vis-à-vis one another” (McAdam, 2007, p. 253, quoted in Fligstein and McAdam, 2012, p. 21).

The final, or seventh component is “settlement,” which results after the episodes of contention, where a new meso-level social order is established (Fligstein and McAdam, 2012, pp. 22-23).

3. Illustrating the SAF Approach: A Case of the Next-Generation Automobile Industry Amid US-China Trade Tension

When a field is in the making or in its transformative stage, such as in the case of the next-generation automobile industry, specifying the boundary of SAF is an important but difficult task; the various participants in the field may contest the boundary itself. For example, Sony, an



electronics and entertainment company, has produced a prototype, remotely controllable entertainment EV called New Concept Cart SC-1. As is well known, IT giants such as Apple and Google in the US, Baidu and Alibaba in China, and Softbank and DeNA in Japan are all researching and developing autonomous driving vehicles and EVs. In sum, with the increasing number of new participants in the automobile industry, the boundaries of SAF are becoming highly complex. Elsewhere, I examined the changing and expanding boundaries of the automobile industry positing that participants not only included those from the manufacturing industry and the service industry, but also creative industries (Nakajima, 2019b).

One point worth reiterating here is that the SAF of the automobile industry does not clearly match the boundaries of the nation-states. For example, with its Toyota Research Institute, Toyota conducts a considerable part of its R&D on next-generation vehicles in the US. Therefore, the study of the US-China trade conflict has to take into account these transnational dynamics of the field.

Looking at incumbents and challengers, as well as governance units, there are highly interesting dynamics. First, when seen at the macro, international-relations level, we can say China is a challenger nation, for example, with its bold geopolitical strategies of the Belt and Road Initiative as well as its Made in China 2025 industrial policy.

However, different incumbents and challengers appear if we shift the focus to the more meso, industrial field level. In the field of the automobile industry, the incumbents are clear: the major automakers mostly building vehicles with internal combustion engines. These include the American Big Three (Ford, GM, and Fiat-Chrysler) and the Big Three in Japan (Toyota, Nissan, and Honda). In China, the state-owned Big Three (Shanghai, Dongfeng, and First) are also well known.

Due to the emergence of next-generation vehicles, new challenger companies are emerging in the automobile industry field. A now-famous challenger is Tesla, an American automobile company that specializes in manufacturing electric vehicles with autonomous driving technologies. Tesla was established by Martin Eberhard and Marc Tarpenning in 2003. In April 2004, Elon Musk participated in the 7.5 million US dollar Series A funding. The founding year, 2003, is interesting because that was the same year as GM attempted to mass-produce the EV1, an electric vehicle, that was later announced as a failure (Edwards, 2006).² Tesla continued to work on the production of electric vehicles and in 2007 presented the Tesla Roadster, which was equipped with lithium-ion batteries and had a range of 200+ miles per charge. In 2010, Tesla had

² Note, however, that GM “announced [in January 2021] that they would end the sales of new gasoline-based vehicles by 2035 and replace them with zero emission vehicles, such as EVs” (Bei GM 2035 nen made ni datsugasoline e denki jiōsha nado ni kirikae, 2021).



an IPO (initial public offering) and presented Model S and Model X, which were commercially successful. The last IPO of an automobile company before that was Ford in 1956. In other words, it had been more than half a century before another automobile company (Tesla) issued an IPO. This clearly shows that the current period is one of the major changes in the automobile industry, at least over the past 135 years since the first internal combustion engine automobile was invented by Carl Benz (in 1885).

Although not fully in commercial use, ICT companies such as Apple and Google are also emerging as challengers in this industry, especially with the rise of CASE (connected, autonomous, shared and services, and electric). In Japan, EV venture companies, such as FOMM, are also positioned as challengers. In China, Byton, a venture company established in collaboration with former BMW managers, or Xiaopeng Motors, an electric vehicle manufacturer founded by two former executives at the Guangzhou Automobile Group Co., Ltd., are similar challengers.³

One important and interesting point from the perspective of the SAF theory: incumbents and challengers crosscut the boundary of nations. For example, China is a challenger at the macro-level of international relations vis-à-vis the US, an incumbent. However, when we shift the focus to the field of the next-generation automobile industry, challengers exist vis-à-vis the incumbents of the Big Threes in the US, Japan, and China in all three countries under discussion in this paper: the American company Tesla, the Japanese company FOMM, and Chinese companies Xiaopeng, Nio, and others.

Looking at governance units at the international level, there are international trade organizations such as the WTO. There are others at the regional level, for example, the Asian Development Bank. The AIIB (Asian Infrastructure Investment Bank), led by China, is emerging as an increasingly powerful “challenger” governance unit at the regional level. At the industrial field level, governance is more complex. First, there are automobile manufacturers’ associations, such as the Alliance of Automobile Manufacturers in the US, the Japan Automobile Manufacturers Association in Japan, and China’s Association of Automobile Manufacturers. In addition to these trade associations, numerous government regulatory bodies oversee the industry. For example, first, there are government offices overseeing safety standards. In the US, the NHTSA (National Highway Traffic Safety Administration), the US Department of Transportation agency, oversees this area. In Japan, the National Agency for Automobile Safety and Victims’

³ Note that “Byton, a formerly highflying Chinese electric-vehicle startup, missed payments to workers and idled production lines as a local court started bankruptcy hearings” (Limin and Cao, 2021). The failure of Byton shows that challengers often lack “the advantages—material, cultural, political—enjoyed by incumbents” (Fligstein and McAdam 2012, p. 22).



Aid, an Independent Administrative Corporation affiliated with the Ministry of Land, Infrastructure, Transport and Tourism, is responsible for assessing safety. In China, C-NCAP is administered by the China Automotive Technology and Research Center Co., Ltd. (CATARC), which is a Central Corporation belonging to the State-owned Assets Supervision and Administration Commission of the State Council.

There is no organization overseeing industrial policy in the United States; administrative initiatives are handled through laws. For example, the Bush administration began the Automotive Industry Financing Program in 2008. Also, the American Recovery and Reinvestment Act (ARRA) from the Obama administration included tax exemptions for buying and using certain types of vehicles. In Japan, METI's Automobile Division is responsible for automobile industrial policy. In China, one of the ten key areas in the Made in China 2025 policy, prepared by the National Development and Reform Commission, is green energy and green vehicles.

As characterized by the keywords CASE and MaaS, the next-generation automobile industry spans widely diverse industrial fields, so many other government agencies not directly related to the automobile industry are also important players in the field. For example, due to the need for highly efficient connectivity for the next generation of vehicles, such as 5G, in Japan, the Ministry of Internal Affairs is becoming a key government player in the next-generation automobile industry. How these governance units play out at the international, regional, and national levels will strongly influence the future of this industry.

There are a number of ways that “social skill and the existential function of the social” can be analyzed. One approach is the social skill of key individuals in the next-generation automobile industry. One clear example is Elon Musk, the CEO of Tesla and the chairperson of Tesla's subsidiary, Solar City, a solar energy products and services company (Vance, 2016). He is also the co-founder and CEO of SpaceX, an aerospace technology company. Musk was born in South Africa. His talents in computer science and management were noticed when he was a child. At age 10, Musk bought a PC and taught himself programming. At age 12, he sold Blaster, a commercial software program he had developed. He moved to Canada and later graduated from the University of Pennsylvania's Wharton School in the US. He entered graduate school at Stanford University but left soon after to pursue a business career. His numerous business successes include ZIP2 and X.com (later merged with another company to form PayPal). In 2002, he established SpaceX, an aerospace transportation company that develops and produces rockets. He joined Tesla in 2003.

Musk's candidness in expressing his opinions—especially using social media such as Twitter—is well known. For example, Musk shared a story by *USA TODAY* that reported the automobile industry incumbent Daimler's investment of 1 billion US dollars in electric vehicles



(Bomey, 2017). Musk tweeted (Stocksdale, 2017):

That's not a lot of money for a giant like Daimler/Mercedes. Wish they'd do more. Off by a zero.

(elonmusk, 2017)

To this provocative tweet, Daimler responded:

You're absolutely right @elonmusk. Here's the missing zero: Investing > \$10bn in next gen Evs & > \$1bn in battery prod.

(Daimler, 2017)

At times, Musk's social media messages have adverse financial outcomes. For example, as widely reported in the media, on April Fool's Day in 2018, Musk tweeted:

Tesla Goes Bankrupt

Palo Alto, California, April 1, 2018 – Despite intense efforts to raise money, including a last-ditch mass sale of Easter Eggs, we are sad to report that Tesla has gone completely and totally bankrupt. So bankrupt, you can't believe it.

(elonmusk, 2018)

The above tweet was obviously an April Fool's Day joke, but on the following Monday, April 2, Tesla's stock price fell 5% (McGregor, 2018).

The flipside of Musk's characteristic mischievousness is a series of carefully calculated and socially skilled maneuvers. For example, in March 2018, using Twitter, Musk asked President Trump to negotiate with China to lower import taxes on automobiles and to remove the 50 percent cap on foreign ownership of automakers in China (Elon Musk Baited Trump, 2018). Trump agreed with Musk on these issues, and continued to negotiate with China. In April 2018, the Chinese government announced that it would end restrictions on foreign ownership of automakers in China by 2022 (Sugiura, 2018). For EV manufacturers, the restrictions would be lifted by the end of 2021. In May 2018, Tesla Shanghai was established, and in July 2018, Musk signed an agreement with the Shanghai municipal government to build Gigafactory 3 (How Elon Musk Built a Tesla Factory in China, 2020). The first batch of automobiles from the factory was delivered in December 2019 (Tesla delivers its first 'Made in China' cars, 2019).

An example from China of socially skilled actors is *haigui* (returnees from overseas,



literally “sea turtles”) who studied in the US and worked in American hi-tech companies, such as Apple, Google, and Tesla. *Haiguais* are emerging as key players in the field of the next-generation automobile industry because an increasing number of them (who have experiences in the US and other countries with advanced technologies) are returning to China to either establish or work in startups focusing on the development and production of next-generation vehicles. One case is Roadstar.ai, a startup Chinese automaker established in May 2017 in Shenzhen. Roadstar took the world of next-generation vehicles by surprise when the company claimed to have produced a level 4 autonomous driving car within one year of being founded. According to the official website:

Roadstar.ai is an artificial intelligence startup that specializes in level 4 autonomous driving technologies. It was founded by three engineers who had previously led autonomous driving technologies at Google, Tesla, Apple, Nvidia, and Baidu USA. (Roadstar.ai, n.d.)

In many ways, *haigui* are socially skilled entrepreneurs and challenger actors in the next-generation automobile industry because of their high level of cultural capital from education and experiences developing advanced technologies as well as social capital connections to both the Chinese and English-speaking worlds of the next-generation automobile industry.

One crucial caveat on the company Roadstar.ai: According to a news report, Roadstar.ai is in the process of filing for bankruptcy (Deng and Dai, 2019). The exact reason for the bankruptcy is unknown, but a news source provided this description:

The recurring internal scandals and disputes within the administrative team of Roadstar, the company’s stagnant R&D progress and the failure of producing actual driverless car have drained out shareholders’ patience, (Gao, 2019)

It is clear that the administrative team at Roadstar.ai had enormous social skills; they had raised 128 million US dollars in Series A funding. However, as the SAF theory also points out, “the use of innovative and previously prohibited forms of collective action” (Fligstein and McAdam, 2012, p. 21) is difficult to sustain due exactly to the newness of the strategy.

“Social skill and the existential function of the social” exist also at the level of organizations. For example, major automakers’ company visions and mission statements can also be seen as reflecting the social skill and the existential function of the social. Daimler’s CASE is



one such example. Toyota also has recently put forward a vision that is quite different from the past when the company was based solidly on the production of internal combustion engines as well as hybrid vehicles. One important keyword for Toyota's vision is Autono-MaaS. At CES 2018, held in Las Vegas, Toyota's autonomous EV vehicle, e-Palette Concept, was presented:

The concept reflects one of Toyota's visions for Automated Mobility as a Service (Autono-MaaS) applications. It is a fully-automated, next generation battery electric vehicle (BEV) designed to be scalable and customizable for a range of Mobility as a Service (MaaS) businesses. What's more, the e-Palette Concept demonstrates Toyota's continued commitment to partnership and flexibility.
(Toyota, 2018).

At that same event, Toyota's President Akio Toyoda stated:

The automobile industry is clearly amidst its most dramatic period of change as technologies like electrification, connected and automated driving are making significant progress. Toyota remains committed to making ever better cars. Just as important, we are developing mobility solutions to help everyone enjoy their lives, and we are doing our part to create an ever-better society for the next 100 years and beyond. This announcement marks a major step forward in our evolution towards sustainable mobility, demonstrating our continued expansion beyond traditional cars and trucks to the creation of new values including services for customers.
(Toyota, 2018)

Note that Japan's largest automaker, Toyota, is now trying to use MaaS as a key strategy for survival in the age of the next-generation automobile industry. Whether this move by Toyota from a "manufacturing company" to a "mobility company" succeeds or not remains to be seen. However, the case of Toyota suggests that there are now increasingly competitive displays of the new corporate identities of companies, showing the importance of the existential function of the social also at the organizational level.

As described above, "the existential function of the social" (Fligstein and McAdam, 2012, p. 18) "emphasize[s] that social skill is the idea that people want to produce collective action by engaging others" (Fligstein and McAdam, 2011, p. 7). I also argued (above) that Fligstein and McAdam's concept of social skill builds on the conceptualization of social action in classical American pragmatism. Routine, habitual actions are emphasized in pragmatism, but contingency



and creativity of action are equally emphasized compared to, say, Bourdieu's notion of habitus (Bourdieu, 1977, pp. 82-83). The notion of habitus suggests that the goal of action is to subconsciously enhance the actor's position within a given structure of social space and attendant interests (Gross, 2002, pp. 53-54). In contrast, in American pragmatism, there are no strict distinctions between the goals and means of action as they pragmatically engage in strategies of action (Swidler, 1986, pp. 276-277); American pragmatism emphasizes the creative discovery of lines of action (even the change of goals) (Whitford, 2002) as actors construct their identities and interests. Using this understanding of the logic of social action, the increasingly competitive displays of the visions of the future of the next-generation automobile industry presented by automakers (for example, Daimler's CASE or Toyota's Autono-MaaS) support the fact that, at least at the present stage of development of the field of this industry, the interests of the actors in the industry are changing and are being constructed through social interaction.

One of the most significant contributions of the SAF theory for understanding meso-level social orders is its analytical edge in understanding social change and agency. If, as argued above, the automobile industry is in the midst of a once-in-a-century transformation, then the SAF theory should provide an important analytical perspective through which the transformation can be explained, and the SAF theory posits inter-field relations as sources of social change. According to Fligstein and McAdam:

The main theoretical implication of the interdependence of fields is that the broader field environment is a source of routine, rolling turbulence in modern society. A significant change in any given strategic action field is like a stone thrown in a still pond sending ripples outward to all proximate fields. This does not mean that all or even most of the ripples will destabilize other fields. Like stones, changes come in all sizes. Only the most dramatic are apt to send ripples of sufficient intensity to pose a real threat to the stability of proximate fields.

(Fligstein and McAdam, 2012, p. 19)

Following the observation in the above quote, this exploratory paper provides one possible example of how the fourth, fifth, and the sixth elements of the SAF theory—4) broader field environment, 5) exogenous shocks, mobilization, and the onset of contention, 6) episodes of contention—might play out in the field of the next-generation automobile industry.

One interesting example of inter-field relations and their ripple effects is the case of the invention of a new type of magnet that can be used for motors in electric and hybrid cars. This invention could be thought of as an unintended consequence of an exogenous shock that emerged



in the broader field environment of the political field regarding the international relations between Japan and China.

As was widely reported, on the morning of September 7, 2010, the 2010 Senkaku boat collision incident occurred. *Minjinyu* 5179, a Chinese fishing boat, collided with Japanese Coast Guard vessels while operating in disputed waters near the Senkaku Islands. The Japanese Coast Guard arrested the captain for obstructing the performance of public duty and brought the captain to Ishigakijima. The 14 other crewmembers were also transferred onboard *Minjinyu* 5179 to Ishigakijima. The Chinese government protested the arrest and demanded the immediate release of the captain. All 14 crewmembers were released on September 13, and the captain was released on September 25, 2010.

As the above incident was playing out, the Chinese government put forward a series of retaliatory sanctions. For instance, once an extension to the captain's detention was decided on September 19, 2010 (Chūgokujin Senchō no Kōryū wo Enchō, 2010), the Chinese government announced a halt to communications with Japan at the ministerial level, as well as a halt to discussions to increase the number of flights between Japan and China and the postponement of meetings on the effective use of coal (Chūgoku, Kakuryōkyū no Nicchūkan Ōrai Chūshi 2010). On September 20, the Chinese government announced that it would fine Toyota for its "illegal" promotional activities in China (Page and Shirouzu, 2010) and postponed the invitation of Japanese college students to Shanghai Expo 2010 (Okudera, 2010). On the same day, Chinese police arrested four employees of the Fujita construction company for allegedly taking photos of military areas in China (Ozaki, 2010).

The most relevant action to the topic of this paper was the *de facto* embargo on the export of rare-earth minerals or intentionally slowing down the customs processing of these exports to Japan (Bradsher, 2010). Japan's embargo on rare-earth minerals did not last long (Kamiya, Fukuyama, and Furuya, 2010). However, the Japanese government, realizing the risk of over-reliance on rare-earth minerals from China, announced measures to prevent a similar risk from reoccurring in the future. According to Reuters, "Japan's government set aside 53.3 billion yen (\$650 million) in its budget for the financial year starting in April [of 2011] to secure supplies of rare earth minerals and other promising but rare natural resources" (FACTBOX – Japan Budgets \$650 mln for Rare Earths, 2011). The report listed five budget items:

Development of rare earth minerals overseas: 19.7 billion yen

Recycling and developing alternative technology: 1.6 billion yen

Developing offshore oil and gas in Japan: 16.3 billion yen

Pre-feasibility study on methane hydrate deposits: 8.9 billion yen



Study on cobalt rich crust, other undersea reserves: 6.8 billion yen

In response to the 2010 Senkaku boat collision incident and the ensuing *de facto* embargo of rare-earth element exports, discussions emerged in Japan's business community on "China risks." In the discussions most relevant to this paper, Japanese trading companies set out to diversify the risk of relying on rare-earth minerals from China. For example, Sojitz invested in Australia, Sumitomo in Kazakhstan, Mitsubishi in Brazil, Marubeni in South Africa, and Toyota Tsusho—in collaboration with Sojitz—in Vietnam (Ōtेशōsha, Rare Earth Chōtatsusaki Kakudai, 2010).

The flip side of the coin of reducing reliance on particular countries—in this case, China—is the R&D being done by Japanese companies to reduce the use of rare-earth minerals. For example, according to one news report, "Toyota announced on the 20th [February 20, 2018] that it has successfully developed a new type of magnet that reduces the use of the rare earth neodymium to about half, and does not lose functionality at high temperatures, for the first time in the world." (Toyota, Motor Jishaku de Rare Earth Hangen Kanō na Gijutsu Kaihatsu, 2018).

It is well known that the increasing numbers of electrically powered vehicles (EV's) have led to skyrocketing demand for rare-earth elements and metals. As the demand shot up, the actions of key producing countries, such as China's policy for exporting rare-earth elements, were expected to have a huge impact (exogenous shocks and rippling effects, to use the SAF theory terminology) on the development of motors used in EV's. For example, China produces more than 80 percent of the neodymium in the global market (Isaak, 2018). In other words, one of the key motivations behind the development of new magnets is international relations between China and Japan, which shows the utility of thinking about the development of the next-generation automobile industry using the concept of inter-field relations.

Toyota's recently developed magnet replaces neodymium with cheaper and more abundant rare-earth minerals that can function at high temperatures. Toyota plans to put this new magnet to practical use in the early half of the 2020s for power steering. Toyota is also planning on using this magnet in mass production within ten years for powertrains (Toyota, Motor Jishaku de Rare Earth Hangen Kanō na Gijutsu Kaihatsu, 2018).

Other automakers are also working on developing new types of magnets. For example, Honda, in cooperation with the Daido Steel Group, has developed a neodymium magnet that does not use heavy rare-earth elements, such as dysprosium and terbium, to reduce supply risks, in particular from China. Honda is already using this magnet in their hybrid automobiles (Toyota, Motor Jishaku de Rare Earth Hangen Kanō na Gijutsu Kaihatsu, 2018).

Similarly, auto parts makers are working on developing technologies and parts that reduce



reliance on rare-earth elements. For example, JTEKT Corporation announced on January 24, 2019, the development of a motor that does not use heavy rare-earth minerals, such as neodymium and dysprosium (Rare Earth no Shiyo wo Osaeta Jyūkidorui-free Motor no Kaihatsu ni Seikō, 2019).

Although the *de facto* embargo on exporting rare-earth minerals (mentioned above) applies to China-Japan relations, a similar attempt to stop exports of rare-earth minerals to the US is under discussion (Bradsher, 2019), which corroborates the analytical utility of thinking of US-China relations as inter-field relations.

As the US-China trade conflict is ongoing, the seventh component of the SAF theory, settlement, is by no means in sight. The trade conflict and the constituent field of the next-generation automobile industry probably are in the middle of the SAF theory's fifth and sixth components, or exogenous shocks, mobilization, and the onset of contention, as well as episodes of contention.

4. Conclusions: Utility of the SAF Theory: Disaggregating the State in the US-China Relations

As stated in the Introduction, a critical task of a sociological approach to understanding US-China relations is to analytically disaggregate the notion of the state. One way to think through this issue is to employ the “organizational state” concept put forward by Edward Laumann and David Knoke (1987). In contrast to the traditional view of states as monolithic actors, the concept of the organizational state sees a state as made up of multiple complex policy domains, having participants that include both state and nonstate actors. According to these authors, a policy domain is:

... a subsystem identified by specifying a substantively defined criterion of mutual relevance or common orientation among a set of consequential actors concerned with formulating, advocating, and selecting courses of action (i.e., policy options) that are intended to resolve the delimited substantive problems in question.

(Laumann and Knoke, 1987, p. 379)

Understandably, although not unitary actors, organizational states are characterized by stability because the dominant, incumbent actors often have enough resources to handle policy problems as well as possible solutions. However, at times, politicization and contestation occurs as “the result of poorly understood processes whereby key actors come to contest the symbolic framing in which ‘routine’ decisions had heretofore been made.” (Laumann and Knoke, 1987, p. 30)



To more clearly elucidate the “poorly understood processes” of change (Laumann and Knoke, 1987, p. 30), Fligstein and McAdam (2012) explicitly attempt to theorize the mechanisms of change, in addition to explaining stability. As stated above, the SAF theory sees sources of change emerging from the interdependence among fields. In particular, Fligstein and McAdam emphasize the important relations between state and nonstate fields:

Typically, field research has focused on the internal workings of a single strategic action field. These dynamics are obviously very important, but as we have tried to make clear, the long-term prospects for stability and change in a field are affected at least as much by threats and opportunities that arise outside of the field—usually in proximate fields of the state fields—as those within the strategic action field itself. To accurately capture the dynamics of any given field the analyst must, in our view, understand the internal structure and workings of the field and the broader set of relationships that tie any given field to a host of other strategic action fields (including various state fields).

(Fligstein and McAdam, 2012, p. 169)

In sum, the SAF theory extends the “organizational state” conception of the state by pointing to the complex overlaps of various fields in the state. Moreover, by further extension, the SAF theory adds the explicit focus on inter-field relations, especially those relations between state and nonstate fields as sources of dynamics in any given field. In the words of Evans and Kay, who employ the SAF theory, the SAF theory conceptualizes the state as “an aggregation of multiple fields that overlap with nonstate fields” (Evans and Kay, 2008, p. 973).

More concretely relating the SAF perspective to the topic of this paper—the US-China trade conflict in the field of the next-generation automobile industry, this perspective enables us, on the one hand, to look beyond international relations as state-to-state relations by disaggregating the state into a complex system of fields that overlap. On the other hand, this perspective also allows us to look *beyond* a particular field—for example, the automobile industry—by foregrounding the important role of the state as well as international relations as they influence and interact with the automobile industry field. In sum, the SAF perspective bridges the gap between the traditional international relations view of the trade conflict as state-to-state relations and the narrower industry-focused research typical of traditional meso-level industrial-sociological approaches.

The remaining tasks for this research topic are many. First, empirical discussions in this paper are all preliminary illustrations; more detailed and substantive case studies are essential if we are to fully understand the structure and dynamics of the US-China technological competition



using the theory of SAF. Second, due to space limitations, in this paper, there were no systematic discussions of causal arguments of the SAF theory—except for the example of the invention of new types of magnet, partially caused by the boat collision incident. Looking closely into various current empirical studies would be useful for clarifying causal mechanisms in the SAF theory. For example, Sara Quinn’s (2008) work explaining the causes of the emergence of the secondary market for life insurance in the United States in the 1990s brings to mind the importance of analyzing different cognitive conceptions of actors positioned in different locations of SAF of the same phenomenon. Doug McAdam’s (McAdam, 1999, xix-xxi) work highlighting the importance of the broader field environment on a certain field would also sharpen our understanding of the causal mechanisms of SAF, especially his work on the influence of international relations between the US and the Soviet Union during the Cold War on domestic socio-political dynamics of the Civil Rights Movement.

5. Policy Implications

This paper has primarily been a social scientific attempt at understanding the complexity of US-China relations from a sociological perspective, and is not focused on specific policy analysis. Hence, presenting concrete policy suggestions is beyond the scope of this paper. There are, however, broad policy-relevant lessons—a sort of mindset, if you will—that can be extracted from the preceding analysis, and that may be helpful in devising effective policies in the future.

First, the SAF theory argued for the importance of inter-field relations and ripple effects. In social phenomena as complex as critical and emerging technologies including the next-generation automobile industry, a diverse array of fields are connected and influencing each other, and often produce unintended consequences, as I showed in the case of the relation between the Senkaku boat collision incident and the invention of new magnets that rely less on rare-earth minerals. Consequently, policymakers need to possess a birds-eye view that covers multiple fields. As Max Weber (1958) observed more than one hundred years ago, the efficiency of bureaucracy rests on the division of labor and specialization, and this remains true today. However, more so than in the past, coordination mechanisms among different ministries and divisions are essential if policymakers are to produce effective policies. Especially in the field of the next-generation automobile industry, which is increasingly combining aspects of manufacturing, service, and creative industries (Nakajima, 2019b), cross-ministerial collaboration and information sharing are important. For example, in the age of the next-generation automobile industry, the question arises as to which division should be responsible for policymaking. If we follow the traditional manufacturing-centered concept, METI’s Automobile Division may be responsible. But if we foreground the software, content, and entertainment aspects of the industry,



METI's Creative Industries Division may be responsible. If we focus on the “connected” aspect of CASE, then various divisions of the Ministry of Internal Affairs and Communications may be responsible. In addition to these industrially-focused oversights, the Ministry of Foreign Affairs may approach the relevant issues from the point of view of national security, and the Ministry of Education, Culture, Sports, Science and Technology may approach them from the point of view of education and training for scientific advance, including international academic exchanges. I do not contend that the ministry boundaries should be erased; a clear division of labor based on professional knowledge and expertise is a must. However, given the rapidly changing and increasingly complex development of the next-generation automobile industry, a more integrated vision of the industry's development is required to guide effective division of labor.

Second, the SAF theory argued that each “field” (for example, artistic, religious, scientific, political, and economic), albeit inter-related with others, operates according to relatively autonomous logic unique to itself. In other words, fields are “relatively autonomous social microcosms, i.e., spaces of objective relations that are the site of a logic and a necessity that are *specific and irreducible* to those that regulate other fields” (Bourdieu and Wacquant, 1992, 97, emphasis original). These logics are often based on taken-for-granted cognitive frames that feel natural to the social actors in question, and hence are relatively resistant to change (Zucker, 1977). In this case, an important first step in effective policymaking is to recognize and then at least temporarily relativize your own cognitive frame and try to understand and interpret the cognitive frames of others—in a manner akin to Max Weber's “interpretive sociology” (Weber, 1981)—not necessarily agreeing with, but understanding the intention and meaning of social actors in their own terms. Only by first understanding the cognitive frames of various actors in the field, can policymakers move forward with changing them—if deemed necessary from the point of view of national interest.

Third, in international relations and foreign policy, we often talk about changing the behaviors of other states in order to promote our own national interests. This aspect of external imposition, as it were, of power is of course important. We may, however, need to be aware that other types of power dynamics may operate in international relations—that is, we should not misunderstand the “strictly relational character of power relationships” that Michel Foucault calls a “power network” (Foucault, 1978 [1976], 95). For example, as I have already cited a few times in this paper, Doug McAdam (McAdam, 1999, xix-xxi) has shown how international relations between the US and the Soviet Union during the Cold War became interlinked with the domestic socio-political dynamics of the Civil Rights Movement. The mechanism presented by McAdam is that, as the US escalated its critique of the Soviet Union as undemocratic, domestic problems of discrimination against black people undermined such criticism against the Soviet Union, both in



the international arena and domestic politics. Once US policymakers realized this, they ended up supporting, if not initiating, the Civil Rights Movement.

Similar linkages may need to be acknowledged in the case of Japan. For example, recent problems regarding the mistreatment of foreigners in Japan by immigration officers (see, e.g., “Japan Immigration Footage Shows Mistreatment of Detained Foreigners,” 2021) require rectification. The most important reason for rectification is of course because such mistreatment is undemocratic and unethical, but an additional purpose would be to strengthen the legitimacy of Japan’s criticism against certain undemocratic practices of China that are increasingly influencing the economic and trade relations between Japan and China (see, e.g., Nikkei Staff Writers, 2021).

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