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Evidence-based Policy Making and Policy Evaluation

Making Public Policy with Big Data?
- How to deal with uncertainty -

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Abstract

This exploratory study investigates into several questions regarding the difficult utilisation of new types of evidences, such as Big Data, through theoretical analysis with a case of sport policy.

The research questions are: to which extent do we (academia, government agencies, lawmakers, etc.) have evidences which contribute to design and implement public policies; and whether we can make public policy based on evidences if we have them. And the case is: ticketing data of London 2012 Olympic Game and the attempt to use them to design public policy.

The existence of Big Data was well known; however various policies discussed, designed, and implemented after the event failed to utilise the data. Thus the questions of the case are; why the evidences were not utilised in making policies; and whether they tried to use the existing data when they discussed and designed policies.

Researches suggest that the understanding of information depend upon the way it is presented. Indeed, more detailed content will negatively affect understanding and this negative affect will be stronger when the information is structurally fluent. The results of literature review demonstrate that information understanding is heavily dependent upon presentation – individuals exposed to more detailed information understand the information worse than those exposed to less detailed information. This relationship is strengthened when the information is structurally fluent. The research results suggest that guaranteeing individuals the access to information does not necessary mean that they understand it, because of cognitive constrains, according to the cognitive load theory.

Observing the issue from the viewpoint of uncertainty, we know that quickly-developing high-tech and/or ICT-related fields have various uncertainties, mainly because of their nature. At the same time, there are strong attentions and expectations, especially from lawmakers and the industry, because of their potentials. The technology-driven fields, indeed, have always been controversial. Past cases and researches show that the policy design and implementation in these areas and/or policies using technology-driven evidences have often been driven by political ambitions and business interests, resulting in wrong investment and policy failure (Callon, 1995; Kudo, 2015). These policies often lack objectives and goals, making them difficult to evaluate. This lack of clear objectives and goals turn out to be an opportunity to some lawmakers and bureaucrats, who like to aim higher without clear definition of their ambiguous goals. These ambitious but ambiguous goals survived among various policies including

sport related policies, until the era of austerity budget, but then strongly criticized by lawmakers themselves as well as the taxpayers (Kudo, 2015).

The research adopts qualitative analysis, including analysis of literature and primary documents, and semi-directive interviews. Although it is one case study, it provides preliminary investigation and to generate hypotheses for further studies. The selection of the case has been conducted based on the relevance to the subject under investigation. The collection of data is carried out through different sources, in order to allow a better accuracy and to ensure the triangulation of the resources used (Strauss, Corbin, 1990; Lee, 1999). In particular, data will be collected through semi-structured interviews to some actors for enriching the data and better understanding the links between the object of investigation and the context.

Introduction

Strategic investment in sport and sport events in order to compete on the international stage has become an integral feature of the sport development policies among most nations competing at major international events. Researches in this area suggest that there are number of characteristics and practices that nations use to identify, develop and prepare their athletes for international sporting success (de Bosscher *et al*., 2015, 2016; Gowthorp *et al.*, 2016; Green & Oakley 2001, Houlihan & Green 2008). However, national sport systems are heavily dependent on significant funding usually from government and/or the commercial sector. Thus, especially for the governments, it has become more and more important to legitimatise their investment not only from elite sport, also from non-sport points of view, including health and well-being of the population.

The research explores whether major sport events (MSE) can be a vehicle for developing high performance sport, where sport actors can leverage the MSE for government investment in sporting infrastructure and high performance sport to create high performance sport legacy and whether governments can develop various legacies besides elite sport, including Big Data for future policy making.

In order to be considered a major sporting event, Emery (2002) suggests that the event must receive national or international media coverage; have a single elite sports competition attracting a minimum of 1,000 spectators or have multiple sport competitions involving elite athletes and be sanctioned by the appropriate sport governing body. Preuss *et al*., (2007) additionally proposed that MSEs require a large number of sport competition venues and training sites. Olympic Games as well as regional multi-sport events, such as the Pacific Games and African Games meet these

characteristics and the capital investment required to stage MSEs can provide the sporting infrastructure identified as missing in many developing sport systems (Andreff, 2001; Reiche, 2016).

The purpose of this paper is to investigate why collected ticketing data of London Olympic Games in 2012 has not been fully utilised neither for analysis nor for making related public policies. The paper examines the extent and nature of a sport legacy of one MSE, which is the 2012 Olympic Games in London. The paper begins with an overview of literatures, followed by a description of the case that focuses on the 2012 London Olympic Games. The results of literature review and interviews to some key actors are presented and discussed and implications for event legacy, especially that of Bid Data are considered. In doing so, this paper will make significant contributions to knowledge of sport development and in understanding use of major sport event for sport legacy.

1. Literature Review on Sport Events and their Legacies

The sporting infrastructure required to produce medal winning athletes has been subject to extensive research, which shows that elite sport development systems have macro-, meso-, and micro-level foci. At the macro level there are contextual factors, such as a need for the general professionalization and further development of the infrastructure of an elite sport development system (de Bosscher *et al.*, 2006, 2015; Digel, 2002a, b; Oakley & Green, 2001). Second, there are factors that are not directly related to the actual support of individual athletes and coaches but which improve the management of different elite sport development systems. This cluster of support activities includes comprehensive planning for sports and the identification of priority sports (Böhlke & Robinson, 2009; de Bosscher *et al.*, 2006, 2015; Green, 2007; Reiche, 2016). Finally, at the micro level, there are a number of support services that directly affect athletes and coaches in their daily training, such as a competition structure that provides opportunities for athlete development pathways (Böhlke & Robinson, 2009; de Bosscher *et al.*, 2006, 2015; Sotiriadou *et al.*, 2008; Truyens, 2013). It is important to note that the "trend towards a homogeneous model of elite sport systems" highlighted by Oakley and Green (2001) does not guarantee sporting success (de Bosscher *et al.*, 2008; 2015). Rather, belief in the need for such a system has emerged as it has been shown that the characteristics and practices outlined above are to be found in successful sporting nations and arguably this has coalesced into a 'global understanding' of an elite sport development system (de Bosscher *et al.*, 2008, 2015).

The use of sport events to leverage positive additionalities has become inherent in the

rhetoric and rationale of those staging events of all types and size. Leverage refers to "those activities which need to be undertaken around the event itself…which seek to maximize the long-term benefits from events" (Chalip, 2004). To achieve this, Chalip (2004, 2006) argued that event organisers need to modify their traditional ex-post focus on legacy to an ex-ante one with a focus on using the upcoming event to leverage changes. Matheson (2010) and O'Brien (2007) advocated the imperative to leverage the legacy of sport events to justify public investment so that investment can be seen to be making a long term difference. In an extensive discussion of leveraging of mega sport events (MSEs), Smith (2014) noted that these events can be considered 'as windows of opportunity within which to undertake initiatives'. His discussion outlines how initiatives in a range of areas such as tourism, business support, employment and healthcare have been established to leverage outcome from mega-events. Other research has identified how social impact (Chalip, 2006), national image (Grix, 2013), and community and regional image (O'Brien, 2007) can be leveraged through sport events.

A range of research has sought to define and categorise various types of sport event legacy (Thomson *et al.*, 2013; Veal *et al.*, 2012). Frawley (2011) suggested MSE's legacies can fall into the following 10 categories, while acknowledging that there can be overlap between them: economic impact; non sporting built environment; public life (related to the focus of this paper), politics and culture; information (the focus of this paper) and education about sport; elite performance sport; mass participation sport (related to the focus of this paper); the financial/administrative support of sport; sport physical infrastructure; sporting symbols, memory, history; and health (related to the focus of this paper). Within these categories the legacies may be a combination of intended or unintentional, positive or negative, tangible or intangible, or material or non-material (Preuss, 2015). Horne (2014) further differentiated legacies into selective to universal legacies, based on the number of people they affect. Thus investigating a MSE legacy requires obtaining the perspectives of a range of the event's stakeholders, which was the approach taken in the research set out in this paper.

In addition, sport event legacies don't occur automatically and for a MSE to leave positive legacies requires planning and resourcing by event organisers and other major stakeholders in the host city and nation, coordinated through a planned, integrated, and resourced event legacy strategy. Indeed, Chalip & Leyns, (2002) argued that ex-ante approach requires legacy stakeholders to have both opportunity and resources to leverage the event in order to benefit from the event. As sport is the focus of an MSE, one positive legacy should be to sport itself. For example, planning is needed for high performance (HP) and recreational sport participation and educational programs,

opportunities for coaching, and well-planned, accessible facilities, which will serve ongoing community and high performance sports' needs (Weed *et al.*, 2009).

2. Research Context and Results of Interviews

2.1. 2012 London Olympic Games and the Legacies

London 2012 has been a success not only for its elite sport performance with its historical number of medals, but also for its various soft legacies, including sporting habit of ordinary citizen, health effect, and voluntary activities, which positively have affected the citizens' welfare and well-being. The paper examines the UK sport policy and London legacies in order to address its potentials and issues, considering them also in a perspective toward Tokyo 2020.

One of the 2012 legacies was the ticketing data of the spectators. The data was gathered through the Games and should have been analysed to understand the real picture of population with their sporting habit and health conditions, thus should have been utilised to formulate future public policies. However the precious data has been only partially analysed and little utilised for policy making. The paper investigates the reasons of this through interviews and literature reviews on understanding of information, in order to understand why the Big Data has been difficult to be analysed and utilised. As for Tokyo 2020, beside Augmented Reality (AR) and Virtual Reality (VR), there is big potential for Big Data, Internet of Things (IoT), and Artificial Intelligence (AI) to become new legacies, it is essential to analyse the Big Data of 2012 and its use (and disuse).

London 2012 legacy includes sporting, economic, cultural, and environmental benefits, and aims to ensure that no "white elephants" were created by the 2012 Summer Olympics and 2012 Summer Paralympics. The London 2012 Olympic Legacy is the longer-term benefits and effects of the planning, funding, building and staging of the Olympic and Paralympic Games in summer 2012. It is described as follows:

1) economic – supporting new jobs and skills, encouraging trade, inward investment and tourism;

2) sporting – continuing elite success, development of more sports facilities and encouraging participation in schools sports and wider (should have been base on analysis of the Big Data);

3) social and volunteering – inspiring others to volunteer and encouraging social change

4) regeneration – reuse of venues, new homes, improved transportation, in East London and at other sites across the UK.

Examples of the 2012 legacy benefits and results include:

1) learning – shared knowledge and lessons learned from the construction of the Olympic Park and preparing and staging the Games;
2) economic – 2012 apprenticeships in broadcasting companies;
3) sporting – reports that school sports participation has not been boosted and may not be being taken seriously (missing analysis of the Big Data);
4) regeneration – the re-opening of the Olympic Park as the Queen Elizabeth Olympic Park;
5) tourism – the Games' long term benefits on London's and Britain's tourism industry.

Since the London 2012 Paralympic Games finished on 9 September 2012 the UK Government has unveiled an updated Legacy Plan. Its main points include:
1) funding for elite sport until Rio 2016;
2) investment to turn the Olympic site into the Queen Elizabeth Olympic Park;
3) 20 major sporting events to UK by 2019, with more bids in progress;
4) £1bn investment over the next five years in the Youth Sport Strategy, linking schools with sports clubs and encouraging sporting habits for life (should have been base on analysis of the Big Data);
5) introduction of the School Games programme to boost schools sport and county sport festivals;
6) continued funding for International Inspiration, the UK's international sports development programme, to 2014.

London 2012 legacies were discussed before, during, and after the event. The key actors started to consider them prior to the bidding and continued to revise them.

Criticism of the legacy includes the legacy not meeting its original ambitions with a decrease in 2014/15 in the number of people playing sport for at least half an hour a week. As a matter of fact, the ticketing data should have contributed to analyse the sport and exercise activities of the population and their health and socio-economic conditions, thus to contribute to improve the policy making of related areas.

2.2. Method: Interviews to Key Actors

This research has been financed by the Japan Society for the Promotion of Science (JSPS), Research ID: 16K13004 (2016-2018; research lead Prof. Dr. Hiroko KUDO).
The author conducted series of semi-structured interview to the key actors of 2012 London Olympic Games between November 2016 and May 2017. The interviews were conducted without recording but with detailed transcriptions, in order to encourage interviewees to express freely their opinions and views.

The aim of this research is to investigate whether the 2012 London Olympic Games left

positive legacies, especially in terms of Big Data to improve analysis and policy making. The research approach is a single case of the 2012 Olympic Games with an embedded design (Yin 2014). Data were collected from two sources: semi structured interviews to key actors and written documents available in the public domain. Case study research is appropriate for this research as it makes use of multiple sources of evidence in order to create a picture of the phenomenon under investigation and is methodologically appropriate when exploring complex issues, those that occur over an extended time period (Gratton & Jones, 2010) or when researchers have little or no influence on the event being studied (Yin, 2014) such as in this research.

Document analysis is appropriate in this case based research as documents are a rich source of data and in this instance they provided valuable primary data. Documentary analysis of strategic plans, policy documents, games reports, social media, and ticketing data set itself contributed to the understanding of the case study in three ways. First, the document analysis allowed the context for the case study to be understood, prior to the interviews and data collection. It also provided a historical account of the planning of the Games at its earliest stages. Finally, using document analysis also allowed for triangulation of data obtained through the interviews.

The interviews have been organized as a part of preliminary research of the project and with the collaboration of the local research partner. The list of the interviews is as follows.

Date	Name	Title/role	Organization
07/11/2016	Margaret Nolan	Representative	British Taekwondo
	Simon Mackintosh	Assistant Head Teacher	Wilmslow High School
08/11/2016	Christopher Mackintosh	Senior Lecturer	Manchester Metropolitan University Business School (MMUBS)
	Neil Fowler	Professor, Head of Department	MMU, Department of Exercise and Sport Science
	Catherine Elliott	Senior Lecturer	MMUBS, Department of Management
	Rory Shand	Lecturer	MMU
	Mark James	Professor, Director of Research	MMU, Faculty of Business and Law, Manchester Law School

09/11/2016	Yvonne Harrison	CEO	Greater Manchester Sport
	Peter Fitzboydon	CEO	London Sport
	Tom Mapp	National Schools Development Manager	Rugby Football Union (ex Youth Sport Trust School Games lead and British Softball/Baseball)
10/11/2016	Eugene Minogue	CEO	Parkour UK
	Hayley Fitzgerald		Get Set to GO - Mind
	James Allen	Director of Policy, Governance, and External Affairs	Sport and Recreation Alliance (SRA)
	Lee Mason	CEO	CSP Network
11/11/2016	Emma Boggis	CEO	SRA (ex 10 Downing Street Officer)
27/02/2017	Liz Nicholl	CEO	UK Sport
	Jerry Bingham	Research Manager	UK Sport
30/05/2017	Joyce Liddle	Professor	Université Aix-Marseille

As Dr. Mackintosh's recent PhD work (June 2016) was on "challenge of delivering a mass participation legacy", in which he conducted 53 interviews, 5 focus groups and two ethnographic studies examining mass legacy of London 2012 (undertaken over 2010-2016 period in UK), a preliminary interview was conducted with Dr. Mackintosh, then followed the others. Main questions were on various legacies that the interviewees have been in charge of in terms of research or in practice. Big Data related legacies were discussed with Prof. Fowler, Prof. James, Mr. Fitzboydon, Mr. Allen, Mr. Lee, Ms. Boggis, Ms. Nicholl, and Mr. Bingham. General evaluation on legacies was the main topic of interview with Prof. James, Ms. Boggis, and Prof. Liddle, who advised UK government on the issue.

The idea of gathering ticketing data came from various interests, which are related to several legacies, including sport activities, health condition, and well-being of the population and the event organization knowhow. The data was gathered during the Games and have been kept by the Sport England and shared with other institutions. The data has been partially analysed, but there are few evidences that the analysis has led to policy making. Since the original data is becoming rather out dated, the possibilities that the data would be utilised are rather low.

Some interviewees noted that this underuse was due to several reasons: first, the data

gathering started without clear ideas how to use them, thus had some fundamental issues from the beginning; second, the data analysis has been done in fragmented way and not systematically, thus the potential of Big Data was not fully activated; third, various actors had different ideas without any coordination; and forth and most importantly, many actors did not realise the potential of the data.

So, why the data are often ignored and not utilised for policy making? The interviewees pointed out the lack of awareness of the key actors, the lack of coordination among these, the difficulty of analysis, and the difficulty in interpretation of data and especially in translating into public policy. The last could be also explained from different points of view; research suggests that the understanding depend upon the way information is presented. Indeed, more detailed content will negatively affect understanding and this negative affect will be stronger when the information is structurally fluent. The existence of Big Data per se does not guarantee better understanding of the fact and better policy making.

The results of literature review demonstrate that information understanding heavily depends upon presentation – those exposed to more detailed information understand the information worse than those exposed to less detailed information. This relationship is strengthened when the information is structurally fluent. The research results suggest that guaranteeing the access to information does not necessary mean that they understand it, because of cognitive constrains, according to the cognitive load theory (Sweller, 2010).

3. Cognitive Limitations on Understanding

Citizens are said to possess an imperfect understanding of how they benefit from public policies (Mansbridge, 2009). While transparency is proposed as a means of enabling people to better understand the benefits associated with a particular policy, expanding access to relevant information is only part of a broader solution to improving peoples understanding of the benefits associated with public policies. In addition to improving access to relevant information, government must also work to ensure that policy information is understandable to a broad spectrum of the public (Porumbescu, 2015). To do so, one must consider methods of presentation that are conducive to effective processing, understanding, and use of the complex information citizens are exposed to (Simon, 1982; Eppler and Mengis, 2004; Etzioni, 2010). Along these lines, literature from different areas of psychology offers insight into presentation strategies that can attenuate cognitive constraints and, in turn, bolster policy understanding. The research now draws upon insights offered by cognitive load theory (educational psychology) and

processing fluency (consumer psychology).

Cognitive load theory explains that as the level of mental effort needed to process information increases, individuals' ability to understand the information embedded in the message decreases (Sweller, 1998). Research on the determinants of mental effort has identified two factors as being of particular importance - structure of the message and complexity of the message (Chandler and Swellwer, 1991). Specifically, what this research illustrates is that messages that tend to be more complex and poorly structured increase levels of mental effort that must be expended in order to understand the message and, as a result, detract from understanding (Sweller, 2010). Therefore, reducing complexity and improving the structure of messages communicating government information are two methods that may improve people's understanding of information. And for this very reason, Big Data would not necessary would lead to better understanding and better policy.

3.1. Complexity

Complexity of a message is typically mitigated via two forms of omission. The first form of omission entails reducing the quantity of information embedded in a single message (Sweller, 2010). While reducing the amount of information can detract from an individual's ability to understand the issue in a comprehensive sense, it does increase the likelihood of them better understanding the limited information they are exposed to (Blayney *et al.,* 2015). However, from a perspective of government transparency, this strategy is problematic because it may detract from the public's ability to comprehensively understand a particular policy. Furthermore, and perhaps more importantly, this approach can also conflict with legal obligations that govern public disclosure. For these reasons, the second form of omission, which relates to reducing the level of detail with which the information embedded in the message is discussed, is preferred (Kirschner, 2002). The assumption is that foregoing specific facts and figures when presenting new information will allow individuals to better focus their attention on the salient information in the message (Cook, 2006). That is, using less detailed language allows individuals to exert less mental effort when processing the message and, therefore, improve their understanding of the information in the message (Ayres, 2006).

3.2. Structure

The concept of processing fluency from consumer psychology provides a framework for understanding how the structure of a message can be manipulated in order to reduce cognitive load and facilitate citizens' ability to understand public policy (Reber *et al.*,

1998; Winkielman *et al.*, 2003). Processing fluency research has identified a number of ways in which the structure of a message can be altered in order to help audiences better understand the information they are exposed to (Janiszewski and Meyvis, 2001; Song and Schwarz, 2008). Across the different manipulations, a common theme is that they all attempt to alter, in one way or another, the clarity with which information is presented, by for example, altering letter fonts or breaking a message into bullet points. Yet, despite the variety of processing fluency manipulations, an important observation is made by Rennekamp (2012), who notes that, irrespective of the range of methods used to improve the structure of a message, "the corresponding responses from individuals are remarkably similar across different settings". Specifically, improving the structure of a message to enhance clarity of presentation, irrespective of the precise manner in which it is done, is generally found to improve individuals' ability to process and, ultimately understand, the information they are exposed to (Miele and Molden, 2010)

4. Complexity and Structure of Information

Fung, Graham, and Weil (2007) caution that, because transparency is critical to enhancing citizens' understanding of government, governments must find ways of presenting the information so as to avoid overloading citizens with information and evoking 'policy confusion' (O'Neill, 2002; Fung *et al.*, 2007). Cognitive load theory and processing fluency literature offer methods of attenuating information overload in order to ensure that citizens understand the government information they are exposed to. Among these methods, two have been identified as being of immediate relevance to the purposes of this study – detail and structure (Janiszewski and Meyvis, 2001; Clark *et al*., 2006; Rennekamp, 2012).

The logic underlying these initiatives is that more detailed accounts of government actions make it more difficult for citizens understand what government is doing. This is because greater mental effort must be exerted in order to process the detailed information being presented to them (O'Neill, 2002; Mansbridge, 2009). Prat (2005) adopts a game theoretic perspective to illustrate this point.

Prat explains that, due to cognitive constraints, an agent can overwhelm the principal by burying a message's signal in lots of highly detailed information (Mansbridge, 2009). Research related to cognitive load theory, echoes the sentiments expressed by Prat (2005), while also providing empirical illustrations. This line of research demonstrates across a variety of settings how different methods of enhancing the complexity of a message through, for example, the inclusion of more detailed information (facts and figures) consistently makes the message more difficult to understand (Sweller and

Chandler, 1994; Van Mrriënboer and Sweller, 2005). The reason for this is that increasing the complexity of a message bolsters the mental effort needed to make (comprehensive) sense of the different pieces of information embedded in the message. Conversely, reducing the complexity of a message by using less detailed language can mitigate cognitive constraints, thereby increasing the likelihood that citizens will be able to understand the information they are exposed to.

In line with discussions of information overload, more detailed descriptions of a policy are likely to make it more difficult for citizens' to process the information and, consequently, detract from their levels of understanding. Therefore, in order to improve citizens' levels of understanding, government information that discusses policies in more general terms is likely preferred in that it is simpler, provided it offers an accurate overview of a policy.

A second important means of improving citizens' understanding of a public policy is to ensure that information is structured effectively. Here, structure is understood as the organization of information within a message (Sweller and Chandler, 1994). Ensuring effective structure means the content of a message is organized in a way that reduces the mental effort needed to pick out key points embedded in the message (Song and Schwarz, 2008). As mentioned, there are numbers of presentation methods used to enhance structural fluency (Reber *et al.*, 1998). However, one common method of enhancing the structural fluency of a message is to organize content in a message into smaller distinct issue-specific elements (Paas *et al.*, 2003; Sweller, 2010). Bracketing content in this way results in consumers of the information exerting less mental effort when attempting to identify and consequently process salient aspects of the message (Van Merriënboer and Sweller, 2005). By improving the structural fluency of a message in this way, individuals can allocate a greater proportion of mental effort to interpreting signals in a message and spend less time sifting through noise in the message to identify signals of interest. As such, the effect of policy transparency on policy understanding will be stronger when the structural fluency of the government information outlining the policy is high.

5. Findings and Conclusion

The results suggest that providing individuals with more detailed information about a policy does not necessarily detract from the public's ability to understand that policy. While greater detail did not affect individual's actual understanding of the material they were exposed to, it did negatively affect respondents' perception that they understood the material they were exposed to. Regarding the impact of structure, providing

participants with more detailed information decreased their understanding of the policy only when the information was fluent. To the contrary, varying the level of information detail did not significantly affect participants' understanding of the policy when the information was presented in a dis-fluent manner.

One contribution of this research stems from the insight it provides into the role presentation plays in shaping the impact on understanding. What is becoming increasingly apparent is that simply making more information available is, in itself, not enough to bring about a more informed and understanding citizen. Rather, for transparency to bolster citizens' understanding, steps must be taken to ensure that information is being presented to citizens in ways that they can use it.

The Big Data, thus, per se, do not necessary contribute to better understanding of the fact nor improving the policy making. However the gathering and analysis of Big Data would have certain impact on better understanding and thus making policy. This might be one of the reasons why the data has not been fully utilised in making policies. The other reason is since the sport-related policies have high political interests, policy makers have been rather keen in making policies, not necessary so with available Big Data.

The limitation of this research is that it is heavily dependent on literature research and still lacks many key actors to interview. Also the theories used for the interpretation are limited and could be widened with other points of view. The research, though, tries to contribute to the discussion on why so often the existing Big Data are not fully utilised.

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