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Space, People, Interventions and Time (SPIT): a model for understanding children's outdoor play in post disaster contexts based on a case study from the triple disaster area of Tohoku in north east Japan

Introduction

Increasing evidence reveals that play, especially play in outdoor environments, has intrinsic value for children (Cole-Hamilton and others, 2002; Lester and Russell, 2008) and is considered to be part of the nature of childhood (James and others., 1998). Others have suggested that play can help children to deal with stressful and traumatic life events (Webb, 2007) and that 'children need to play out crisis or trauma' (Terr, 2007, pxi). Research about children's play in non-disaster contexts reveals that children use many different open spaces around housing areas including gardens, play spaces, footpaths, wooded areas, car parks, streets, school playgrounds, parks (Hole, 1996; Department of Environment, 1973; Wheway and Millward, 1997) and found open spaces (Hart, 1979; Moore, 1986), not restricting themselves to designated play spaces in the built environment. This paper addresses some issues about children's opportunities for play in outdoor, and to a lesser extent indoor, environments in the post triple disaster context of the Tohoku region of north-east Japan. The research is set in the context of some of the literature about children and disasters while the research approach, methods, findings and conclusions are set in the context of the unique situation of this part of the world.

Children and disasters

A disaster can be understood as an event that overwhelms local capacity causing great damage, destruction or human suffering (Executive Office of the President of the United States of America, 2003). Disasters are commonly identified as being *natural*: that is earthquakes, floods, hurricanes and tsunamis or *human induced*: including terrorism or mass transportation events (Weissbecker and others 2008).

Children who experience disaster may have to cope with loss of home and property, change of schools, loss of family and pets, altered leisure activities, disruption of family and community resources and relocation (La Greca and others, 2002). This 'cascading series of life stressors' (Weissbecker and others 2008 p32) during a disaster and in the months and years afterwards 'can elicit chronic psychological and physiological stress reactions' (Weissbecker and others 2008 p32). Medical literature reveals that psychological stresses after a disaster can result in children experiencing Post Traumatic Stress Disorder and/or anxiety and/or depression, while a complex range of biological pathways can be adversely affected by children's exposure to disasters resulting in short-term and long-term negative consequences for a child (Weissbecker and others 2008).

Research reveals that following a disaster most children are capable of dealing with one or two major risk factors without significant detrimental developmental consequences, but that when a child experiences multiple risk factors there is an increasing likelihood of developmental damage or on-going troubling outcomes (Boothby and others 2006). A framework has been suggested to help understand the factors which can influence the way a child responds to or is impacted by a disaster. This framework suggests a series of complex and interacting predictive factors including: the nature and exposure to the trauma;

pre-existing characteristics of the child; characteristics of the post-disaster recovery environment and the child's efforts to process and cope with disaster-related distress (Weissbecker and others 2008 referring to La Greca and others 2002). Both cultural and familial attitudes can also influence the impact that a disaster might have on a child (see Weissbecker and others 2008 p 45-46). Parental distress, a child's ability to cope, the family and social environment as well as customs and/or beliefs can protect children. However these factors can also put a child at risk of impaired functioning, poor psychological and physical health outcomes (Weissbecker and others 2008).

Play as part of 'life with dignity' for children post disaster

Lauten and Lietz (2008) considered post disaster protection responses for children who experienced either the Indian Ocean Tsunami of 26 December 2004 or Hurricane Katrina which hit the United States Gulf Coast on 29 August 2005. Their research in Aceh in Indonesia and Baton Rouge in Louisiana revealed children's 'maladaptive behaviour changes' (Lauten and Lietz, 2008 p 166) including inability to sleep, fear of leaving home, fear of going to school, loss of self-confidence and a reduction in play activities with children's peers. Some of the children reported that in their community before Hurricane Katrina they had good friends but had no friends where they were currently living while some children reported that they were taking part in less after school activities. These two factors, together with a decreased desire to help people in their post disaster neighbourhoods revealed a decrease in social connectedness. Thus play can be understood to be a component of social connectedness for children in post disaster situations. One of the issues specifically mentioned by parents in the temporary housing of trailer and mobile home communities after Hurricane Katrina was that 'they were not allowing their children to play outside the cramped trailers due to safety concerns' (Lauten and Lietz, 2008).

Embedded within this research is an implied acceptance, that play is important for children in a post disaster context (Lauten and lietz, 2008). Others have suggested a tenet of enabling people to experience 'life with dignity' (Sphere Project, 2004 p3) after a disaster, but do not explicitly consider provision of outdoor play opportunities for children. Other research drawing upon case studies of children in bombed areas of Beirut, abandoned children in Romania and street children in Rio de Janeiro and Cali clearly identifies that 'play appears to be a key factor in supporting the development of emotional resiliency' (Fearn and Howard, 2012).

Aims and methodology

Aims

The aim of the research reported in this paper was to develop an understanding of the situation with respect to outdoor play opportunities for children in the post-disaster Tohoku area of north-east Japan set in a timeframe thirteen months after the disasters. Research questions identified to achieve this aim were:

- What has happened to outdoor play environments?
- Where are children now playing?
- What constraints are there to outdoor play?

As the research took place reflection on the findings revealed a fourth question: how is outdoor play being supported?

SPIT: an analytical model

Lack of friends and *lack of safe spaces* have been suggested as two dimensions which restrict children playing outdoors in a post disaster context (Lauten and Lietz, 2008).. In Japan the architect Mitsuru Senda (1992) observed children's outdoor play environments between 1968 and 1990 and suggested that 'a child's play environment consists of four elements, *a place to play, time to play, friends to play with* and *what they actually do*' (Senda, 1992 p7). Two of these dimensions, a place to play and friends to play with, reflect those identified from the work of Lauten and Lietz (2008). In addition Fearn and Howard (2012) identified that children created their own play interventions while adults interventions could create time and space for play. These concepts of *place, time, friends, activity, adults, children, time and space* have been used as a starting point for reflection and analysis for the current research. A final framework, or model, called SPIT is suggested which addresses notions of Space, People, Interventions and Time. Space is understood as a notion underpinning those of People, Interventions and Time: the meaning of and relationship between the elements of this model are explored as the paper develops.

Approach and methods

A flexible design approach of a case study based in the geographic area of Tohoku was used. The context, briefly outlined below, means that this can be considered as representing an 'extreme' or 'unique' (Yin, 2003 p40) case. Within the case study approach a multiple set of methods were chosen. These methods were set within a timeframe of a ten day visit to parts of Fukushima, Miyagi and Iwate Prefectures. The large geographic area and limited timeframe contribute to the fact that this should be considered to be an exploratory case study (Yin, 2003).

The first author is not native to Japan and had not previously visited the post-disaster area of Tohoku; the second author is Japanese and has spent considerable periods of time in the post disaster area prior to this research visit. In order to provide the non-Japanese researcher with first-hand experience of some of the consequences of the triple disaster and the effects on the physical and social environment a series of site visits were undertaken. The sites chosen were purposive and consisted of outdoor spaces where research has shown children play: housing areas; kindergartens, schools with external playgrounds and temporary housing locations. Travelling between different towns and sites provided a more in-depth understanding of the post disaster physical destruction and initial reconstruction context for the research. Descriptive observations of the physical setting and condition (Robson, 2011) were supported by the taking of photographs.

Semi-structured interviews were undertaken with a purposive sample of people who had experienced the triple disaster (Robson, 2011). Pre-arranged interviews were undertaken with Principals of some schools, senior staff in key prefectures and a limited number of charity and community workers. On three of the ten days the researchers were accompanied by play workers allowing information to be gathered in a more unstructured way. Conversations were often led by the play workers who were keen to share their experiences, knowledge and even feelings. Similar conversations also took place at some of the temporary housing locations. The Japanese researcher was known to many of the

interviewees. Each semi-structured interview and less structured conversation started with an introduction as to who the non-Japanese researcher was, the fact that their visit was funded by the Daiwa Anglo-Japanese Foundation and that the purpose of the interview or conversation was to explore the situation with respect to children's outdoor play environments in the post-disaster context.

Issues of where children were playing in the outdoor environment, opportunities and restrictions for children's play in the outdoor environment and children's outdoor environments in the reconstruction were discussed. As the research developed, comments on children's experiences of the disasters were sometimes offered by interviewees or mentioned by the researchers. Most interviewees provided other social and physical context relating to the disasters, their own and other people's experiences of the disasters and plans and thoughts for the future.

Ethics and language

The first author was required by their university to undertake an ethics review before departing England to undertake this research. This was done taking cultural differences into account, to the best of their ability at the time. In Japan social research does not require an ethics review.

As part of an ethical approach to the research at the end of each interview the interviewee was thanked and asked if they minded if the information was shared. Only one interviewee did not want their information to be used without it being referred back to their organisation and because of practical difficulties this information has not been used. Most of the interviewees and people involved in conversations were very keen for the information to be shared with others: indeed this was often urged of the researchers, particularly the non-Japanese researcher, because of a feeling that the world had forgotten about the disasters and the people and communities affected.

The interviews, and some of the conversations, were undertaken, in Japanese by the second author. Translation for the first author was partially undertaken by the interviewer but more fully by a Japanese colleague who accompanied the researchers and took the role of an interpreter. The first author wrote notes which were a combination of those written during interviews together with summaries of daily events and encounters.

Context: the Japanese triple disasters of March 2011

Japan sits at the juncture of four of the world's tectonic plates. Positive outcomes of this unique location include the natural phenomena of hot spas and the existence of large, beautiful mountains: destructive outcomes include earthquakes and tsunamis. Indeed 20% of the world's earthquakes (Cabinet Office, Government of Japan, 2010) take place in and around Japan the largest being the Great Kanto Earthquake of 1923 affecting Tokyo, and the Great Hanshin Earthquake experienced by Kobe in 1995. Significant tsunamis, reaching up to 30m in height, were recorded in 1896 and 1933 with a previous large tsunami having taken place in 896 (Matanle, 2011).

On 9 March 2011 the north east region of Japan, Tohoku, experienced a magnitude 7.2 earthquake which some people considered to be the big one that had been expected for some time. Two days later a magnitude 9.0 earthquake took place 100 km east of the coast of Miyagi Prefecture: a result of movement of the Pacific and North American Plates (JMA 2011 and JMA). This was the most powerful recorded earthquake ever to affect Japan and the fourth most powerful recorded in the world since 1900 (JMA 2011, USGS 2011a). The upthrust and subsidence of this earthquake resulted in a tsunami with recorded heights of up to 21.1m (Asahi Shimbunsha, 2011). Within an hour the tsunami travelled over the north-eastern coast flooding more than 500 km² of land and resulting in 26.7 million tons of debris (Asahi Shimbunsha 2001a pp 74-75). The Japan National Police Agency has stated that 16,019 people were killed, 3,805 people are missing and 6,121 people were injured across 20 prefectures (NIED). They have also recorded that 921,435 buildings were destroyed or damaged. The coastal areas of the three prefectures of Fukushima, Miyagi and Iwate were the worst affected.

The tsunami breached the protective walls of the Fukushima Daiichi nuclear power plant making the entire plant inoperable (Matanle, 2011). This resulted in an immediate exclusion zone of 3km soon extended to 20km with people being evacuated from their homes as far as 40km from the power plant because of unsafe levels of radiation being detected (Matanle, 2011). The first two of these disasters can be understood as natural disasters: the third can be considered a human induced disaster, by virtue of the location of and known potential tsunami risk to the nuclear power plant (Weissbecket and others, 2008).

This series of three disasters – massive earthquake, sequential tsunami and destroyed nuclear power plant is unique in the history of known disasters of the world. Some parts of the world have experienced one such disaster, for instance the Pakistan earthquake of 2005 or the Chernobyl nuclear power plant disaster of 1986. Some locations have experienced two disasters, such as countries affected by the Indian Ocean earthquake and tsunami in 2004. Nowhere in the world has experienced all three of these disasters: massive earthquake, tsunami and nuclear power plant failure, and in such a short timeframe. Thus, according to Robson (2003) the case study can be considered as a unique one.

Site visits revealed that there was not much evidence of the earthquake thirteen months after the triple disaster: most of the repairable damage had been repaired. What was evident was the extent and intensity of the damage caused by the tsunami. This rural and coastal landscape, or *satoyama* and *satoumi* (Matanle, 2011 p 836), supported settlements for farming and fishing, rice production and tourism. The linked economic and social structure of the area: farming, fishing, tourism and living was all destroyed. The tsunami travelled 4 km inland for 13km along the Sendai coastal area, (Figure 1) while further north it channelled up river valleys, inlets and rias increasing in height as the valleys narrowed (Figure 2). Houses, schools, shops, community facilities and rice fields were completely swept away or damaged, some beyond repair. Disaster planning had not anticipated a tsunami going up the river valleys resulting in more destruction, inadequate evacuation training and increased loss of life in these areas than had been anticipated.



Figure 1: The Devastated Sendai Coastal Plain



Figure 2: Destruction at Minamisanriku

In Fukushima prefecture and areas affected by the radiation site visits revealed a different picture with less obvious physical damage. Instead there was evidence of empty buildings including homes, schools and shops: abandoned communities. In the initial evacuation people had to leave quickly and were told to leave pets behind and solitary dogs and stray cats were observed in various locations.

The overwhelming concern in Fukushima is about radiation. First of all what the radiation levels really are and second what levels are safe. This is not the place to enter into a debate about this, except to say that these issues are complex, with different understandings being held by different members of community: whether national or local government, community groups, schools or parents. Levels of radiation are measured daily at one metre above the ground outside schools. One major worry is that young children are smaller than one metre in height and radiation falls towards ground level resulting in young children being exposed to higher levels of radiation than are being officially recorded.

Fundamental to the SPIT model is the notion of Spaces for play and this is suggested as including dimensions of: lost, found, re-claimed, temporary, new and absent spaces, many of which can be understood as domestic or neighbourhood open spaces (Woolley, 2003).

Notions of People, Interventions and Time weave through the spatial dimensions as revealed in the following discussion.

Spaces for play

Lost spaces include those which were associated with housing, kindergartens and schools. Examples visited include the Nobiru Kindergarten on the Sendai coastal plain (Figure 3). The Principal had recently had her emergency training and knew how to evacuate the small children. She and staff were assisted by local people who took the children in cars to the evacuation point where they arrived 5 minutes before the tsunami. Water reached 4/5 metres in height in the kindergarten building with the result that the building and its external space were devastated.



Figure 3: Lost space: Tsunami affected Nobiru Kindergarten



Figure 4: Lost space: Burnt out Kadonowaki Elementary School

At Kadonowaki Elementary School evacuation procedures were put in place and everyone went to higher ground (figure 4). Later the school building caught fire leaving a burnt out shell. Severely burnt trees, a damaged outdoor swimming pool and playground, cleared of debris at the time of this research, were evidence of damage. At Okawa Primary School,

further north and in a river inlet, the building and outdoor environment were destroyed and the lack of disaster planning resulted in 68 of the 107 children dying. Parks in Minamsanriku were destroyed and are where disaster debris is stored. The Seaside Park Adventure Playground on the Sendai coastal plain is close to the sea and raised up from the coastal plain by a few metres. Five people were saved, including a play worker, by being rescued by a helicopter from this higher land. The tsunami travelled up the sides of this elevated space which is now out of use because it sits within the first kilometre from the sea: declared as not to be re-used or built on.

Found spaces were observed where children were seeking to play despite the devastation around them. Examples of this included a group of boys playing football amongst the almost complete destruction of Rikuzentakata and two boys making time for football one Saturday morning on the devastated playground outside the burnt out Kadonowaki Elementary School.

Re-claimed spaces were observed in different contexts and locations. Adjacent to the burnt out Kadonowaki Elementary School, again making time on that same Saturday, both children and adults were playing tennis on the slightly elevated and damaged tennis courts. A second example of a re-claimed space is that of the community play space set amongst the housing of Ishinamaki city where some housing reconstruction was underway (Fig 5).



Figure 5: Reclaimed space: community play space

This was a community play space before the triple disaster and adjacent to it was a rice field. Here various people were supporting the possibility for play. A farmer had decided that after the tsunami he did not need the field and so donated it to become part of the play space. Other people instrumental in the intervention to re-claim this space were playworkers and community members. Debris was cleared, a coarse sand surface provided, existing swings reused and new play props such as a barrel donated. A heart of flowers growing on the site seemed to represent the hope of this space. A third re-claimed space was found in the playground of a school in Miyagi prefecture. The whole playground was due to be covered by temporary housing but the Principal and some of the prefecture staff negotiated that only half of the space should be used in this way thus re-claiming an important space for the children (Fig 6). A similar approach was taken on two other temporary housing sites which were located on a park and a recreation ground, where part

of each space had been used for temporary housing while the rest had been left as a playground and recreation ground. It was not clear which people had been involved in these latter interventions to protect some of these outdoor spaces.



Figure 6: Reclaimed space: half school playground saved from temporary housing

Temporary spaces: could be temporary in both space and time and were found amongst some of the temporary housing areas. Such interventions were facilitated by play workers using play buses and visiting locations in Sendai and Ishinomaki using a publicised schedule so that families knew when the play bus and workers would be at each location. The play buses contained many different play props and loose parts for supporting play which are used on the tarmac amongst the temporary housing units.



Figure 7: Temporary space: Play bus intervention supported by play workers visiting temporary housing area

New spaces were seen in different types of locations. In one temporary housing area a small sized synthetic tennis court provided by a commercial sports company was being used by a group of boys for football. The kindergarten devastated on the Sendai coastal plain had been replaced further inland by a series of units for a temporary period of time of five years, the length of time a child might be at kindergarten and therefore not temporary for them. This had been provided by a commercial white goods company and accompanied by a generously sized outdoor space which included a sand surface, opportunities for water play, swings and wheeled trikes (Fig 8). A third new space was Asobiba Adventure Playground in Kesenumma in Miyagi prefecture (fig 9). The people instrumental in this intervention were play workers who, responding to a lack of outdoor spaces for children to play in, developed the site immediately after the tsunami and opened it in April 2011 just five weeks after the triple disaster.



Figure 8: New space: Outside the replacement kindergarten



Figure 9: New space: Asobiba Adventure Playground in Kesenumma facilitated by a play worker

At the Fukushima College Kindergarten the Principal facilitates children's play both indoors and outdoors. A large indoor sand area has been provided in the hall (Fig 10). Plastic sheets protect the hall floor and buckets of water allow children to wash both hands and feet before they leave the hall.



Figure 10: New Space: indoor intervention facilitated by the principal at Fukushima College Kindergarten



Figure 11: Interventions: PEP KIDS in Koriyama

In Koriyama, again in Fukushima Prefecture, a doctor became concerned about the weight and development of babies soon after the triple disaster and developed an indoor provision called PEP KIDS (Fig 11) from concept to reality in eight months, opening it before Christmas 2011. A play equipment company organised an indoor play event over a three day period which attracted 3,500 people. Then a local supermarket provided an old

warehouse and items to support indoor play opportunities. The facility is brightly coloured and designed to provide discrete spaces including a sand and water area, a large ball pool and an area of small ride on wheeled vehicles. In the first three months 100,000 children and parents used the facility with eighty per cent of these being from Koriyama city.

Absent spaces or the absence of spaces was evident on many of the temporary housing locations. These sites contain anything from six to 1,000 temporary housing units: metal containers of two rooms approximately 7.3 m², a small kitchen area and a toilet for a family of four and a third room for families of 5-8. One unit is usually provided as a community room. Older people dominate some of the temporary housing sites a reflection of the ageing population of this rural area (Matanle, 2011). Other locations have children, some have groups of people who had moved from a neighbourhood together, other sites consist of people from different neighbourhoods who did not know each other. On some sites children have made new friends because there are more children in the temporary accommodation than in their pre-disaster communities.



Figure 12: Absent space: Tarmac car parking in temporary housing area



Figure 13: Absent space: But children will play anywhere

Many temporary housing locations had copious provision for car parking in the form of vast areas of tarmac. Some of the vehicular access routes and parking spaces were extremely generous in size (Fig 12) making the authors concerned about such generous provision for cars and yet no outdoor provision for children. Children will play anywhere (Opie and Opie, 1969) and this was evident on some of these sites. Figure 13 shows children using makeshift stilts in the small metre or two strip of tarmac between the lines of temporary housing units.

The authors' concerns about cars and car parking provision were confirmed by a community leader stating, 'the children are playing and concentrate on their playing and are not so concerned about their environment and the cars'. This reflects one of the parental concerns in the temporary communities after hurricane Katrina (Lauten and Lietz, 2008).

People, Interventions and Time for play

Throughout the discussion about the Spatial dimensions, notions of People and Interventions have been mentioned. People have included individuals such as children, adults, play workers, principals, prefecture staff, a farmer and members of the community. People have also been represented by commercial organisations such as an international tennis company and a white goods company. Interventions have included reclaimed spaces, new spaces and temporary spaces in temporary housing areas supported by play workers with play buses.

The notion of time has been mentioned when children and adults have made time for play such as observed on one Saturday morning. But in addition it became apparent that time was a constraint to children's play and this related to two issues. First, contemporary Japanese society puts a great emphasis on school education and children's academic achievements and this has not changed since the triple disaster. The authors were often told that children can only play once they have finished their homework. This was evidenced in one temporary housing area where in a homework bus children could not play until they had completed their homework.



Figure 14: Time: for play restricted by bus travel

Second, since the disaster there has been another factor influencing the time children can spend on play: travel to school. The situation is complex for various reasons. Some

children still go to their own school but if a child's school was destroyed by the tsunami or evacuated because of the radiation the child will be attending a different school. If a child has been evacuated away from their usual physical neighbourhood they will be travelling to a different school. This may be on foot but is also likely to be by bus (Fig 14). Some children were travelling to school on buses before the disaster, partly as a result of schools combining because of the reducing numbers of population who are young. However the numbers of children doing this have increased, and at some schools all the children were travelling to and from school by bus every day. The length of these journeys depended upon how far children's temporary accommodation was from the school and also on road works which would change daily as part of the reconstruction process. A worst case scenario was told where one journey could take ninety minutes in each direction, to and from school, creating a real time constraint on the children's available time for play.

Table 1 indicates something of the relationship between the different Notions of Space, People, Interventions and Time as understood from this research. It is clear that for Spaces to exist in any form for children's play in this post disaster context the notions of People, Interventions and Time are required in some form or another. This model is suggested as a way to understand future research about children's play in post disaster contexts.

Spaces	People	Interventions	Time
Lost			
Found	Children	Football Stilts between temp housing	Saturday After school
Reclaimed	Children Adults Principals Prefecture staff Farmer Play workers Community members	Tennis Tennis Protecting school ground Protecting park/play area Community play space	After school Weekends
Temporary	Play workers	Play bus	As determined by play workers
New	Tennis company White goods company Play workers Principals Doctor Play equipment company Supermarket	Tennis court Kindergarten ground Adventure playground Indoor sand pit PEP Kids	At children's choice During kindergarten When staffed: mainly weekends
Absent			

Table 1: Analysis of the relationship between the Dimensions of Space with the Notions of People, Interventions and Time in the SPIT model for understanding children's outdoor play in the post-disaster context of Tohoku in north east Japan.

Limitations of this research

The authors acknowledge limitations to this research. First the research was undertaken in a very unique context thirteen months after a large earthquake, tsunami and nuclear power-plant failure. Second, the time available for the visit to the disaster was only ten consecutive days limiting the depth and extent of some of the explorations. Third, the people interviewed were purposive, which is valid, but if more time had been available it would have been helpful to interview and converse with more people. Fourth, is that of language: the first author may not have understood responses as fully as they might have done had they understood Japanese and some detail may have been lost in translation. Finally the research did not involve listening to the voices of children. This was partly because of the exploratory nature of the research, the limits of time and the ethical differences between the requirements of the two countries of the researchers.

Conclusion

Despite the limitations, answers have been found to the research questions. It is evident that in the post triple disaster context of the Tohoku region of north-east Japan many of the children's outdoor play environments including spaces around housing, schools and parks have been lost. It is also evident that found, re-claimed, temporary and new spaces exist where children can and are playing. These different dimensions of space exist because of people, whether that is children choosing to play football in a burnt out school playground, play workers providing an adventure playground or a doctor facilitating a new indoor facility. The notion of interventions was also identified from play buses to indoor sand provision. Time as a notion was evident where both children and adults were making time for play but time was also identified as a constraint to children's opportunities for play. In conclusion the SPIT model can help support an understanding of children's outdoor and indoor environments for play opportunities in the post disaster context of north east Japan. The model suggests that Spaces whether *Lost, Found, Reclaimed, Temporary, New or Absent* spaces are influenced by People, Interventions and Time. It is suggested that the use of the SPIT model can help to increase the understanding of social connectedness of children in such contexts and allow children's opportunities for outdoor play to be explicitly understood as part of life with dignity in a post disaster situation.

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