

**CHINESE CHILDREN'S KNOWLEDGE OF FOLKBIOLGY:
AN ALTERNATIVE EXPLANATION FOR ANIMISM**

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Abstract

This study examines Chinese children's understanding of folkbiology through their acquisition of the concept of life using the clinical interview technique employed in Piagetian experiments. The aim of the study is to identify the difference between semantic development and conceptual change in the semantic domain of 'alive'. The subjects were thirty-six 4 to 10 year old Chinese children from the People's Republic of China (PRC). Overall, the findings indicate that the Chinese children respond more 'animistically' compared with English speaking children in previous studies. However, through the examination of the lexicalising process of 'alive' in Mandarin Chinese this paper will demonstrate that Chinese children's acquisition of the concept of life may be guided to a large extent by semantic rather than conceptual principles.

1. Introduction: Stages in the acquisition of the concept of life

Folkbiology, the understanding of growth and natural processes of living things, is a cognitive task which has been widely researched. This paper examines this issue by exploring the concept of life in Chinese children within the Piagetian framework.¹

Piaget's (1929) claims about the development of causal schema and children's understanding of life are well known and will only be briefly summarised here. He proposed that children's concept of 'life' is governed by the following principles:

1. animistic causal reasoning
2. over attribution of intentional states to inanimate objects
3. over attribution of 'alive' to inanimate objects

The above principles are derived from a series of interviews which involved the experimenter questioning or cross-examining children to get at their thoughts and beliefs. This was conducted with children from different age groups. Piaget characterised this animistic development in five main stages. Later, this was further modified by Laurendeau and Pinard (1962:140) into four main stages and this is the version which will be presented here. As demonstrated in Table 1, children use different criteria to justify their assignment of 'life' to individual items.

TABLE 1: **Stages in the meaning of 'alive'** (Laurendeau and Pinard 1962)

Stages	Laurendeau and Pinard
0	No concept Random judgements, or inconsistent or irrelevant justifications
1	Activity or movement Things that are active, that move, or both are alive

¹ Though the current debate (see Wellman and Gelman 1992 for an overview) has moved beyond the concerns raised by Piaget and his associates in the earlys, this study is

'resurrecting' some of the old questions in the hope that they will enable us to better assess cross-linguistic influences in folkbiology research.

2	Autonomous movement Things that move by themselves are alive
3	Adult concept ² Only animals (or animals and plants) are alive

Since 1929, there has been an enormous amount of literature generated in the specific domain of conceptual development. Huang presented a critical review of no less than 21 studies as early as 1943. In this review Huang concluded that the results are inconclusive in supporting the existence of child animism as claimed by Piaget. Huang and Lee (1945) conducted the same experiments with Chinese children and presented evidence to refute Piaget's developmental stages. The reliability of the criteria set up by Piaget and his associates have been extensively discussed in the literature (cf. Carey 1985:13- 23 for a summary). Despite the fact that Laurendeau and Pinard (1962) and Looft and Bartz (1969) convincingly demonstrated that using uniform scoring criteria will produce replicability across experiments, the concept of life studies gradually faded out of general interest as researchers turned to test out Piaget's later ideas on the notion of operativity in the 70s.

Interest in this area was later rekindled by Carey's (1985) work on conceptual change in childhood where she explored conceptual structures in children's acquisition of biological knowledge. Though she replicated the results presented by Laurendeau and Pinard (1962) she argued strongly against the stage-like characterisation employed by Piagetians. By re-examining Laurendeau and Pinard's data, she demonstrated that children at every stage appeal to a range of justifications and fail to produce evidence to support the single-criterion definitions set out in Table 1. In particular, she pointed out that the word *alive* may not actually be mapped onto the child's concept that most closely approximates the adult's concept *living thing*. She hypothesised that the attribution of life to inanimate objects reflects semantic rather than conceptual problems. The criteria set out in Table 1 are more relevant to the distinction between animals and non animals than to the distinction between living and non-living things. She argues that the word *alive* may not be the best way to study children's understanding of the concept of life. In her final analysis, she mounted a critique of Piaget's standard developmental description by arguing that the source of animistic responses is inadequate biological knowledge and acquisition of biological knowledge in the years before age 10 is the reason for the decline of animism.

2. Problems with Piaget's developmental views on cognitive development

Generally, Piaget's characterisation of conceptual change that occurs uniformly across domains in discontinuous stages has been widely criticised (see Gelman & Baillargeon 1983, Karmiloff-Smith 1991). Firstly, there is overwhelming evidence that children acquire concepts in separate domains without using integrative structures that would be required by a general stage theory.³ There is now consensus amongst researchers that conceptual development is best understood within domain specific demarcations. Secondly, Piaget was found to have consistently underestimated the competence of children across domains. The

² Though Stage 3 has often been referred to as the stage where the adult concept is attained, it is in fact a misnomer as attainment of the adult concept necessarily entails an understanding that both plants and animals belong to the ontological category of 'living things'.

³ See Gelman and Baillargeon (1983) for a description of the problem of distinguishing preoperational and concrete operational stages across domains.

tools and tasks used in Piagetian studies were often criticised for being inappropriate (cf. Gelman & Baillargeon 1983:167-230 for further discussion on this point). Moreover, Bullock, Gelman and Baillargeon (1982:233) demonstrated that the underlying structure of a child's knowledge may not be reflected in the child's verbalisations.

Here, I will not be concerned with marshalling more evidence against Piaget's constructivist approach to cognitive development. What I will attempt to do is to demonstrate that even within the confines of specific domains, in this case, the notion of causality, applying Piaget's ideas across cultures and languages generates an added level of complexity. The following sections will explore cross-cultural and cross-linguistic implications drawn from Piagetian research.

2.1 Cross-cultural research on Piagetian experiments

The bulk of research attempting to replicate Piaget's ideas on cross-cultural differences took place in the 70s. Most of these studies found that children from societies little influenced by Western culture fall behind middle-class Western children on most, if not all, tasks by an interval of two to seven years (Dasen 1972). Tasks on conservation, seriation and class inclusion are the main focus for most of these researchers, with only a few reports of studies on 'movement of clouds' and 'the concept of life'. Several studies reported a 'schooling effect' (Laurendeau-Bendavid 1977). Other studies have reported different findings for rural versus urban settings (Oppen 1977, Kelly 1977). Generally, these studies appeal to differences in cultural experience such as SES, Western influence, schooling, rural versus urban settings, cultural differences in perception of authority, among others, to explain discrepancies found in the results.

Some researchers presented cross-cultural differences in attitude to 'talks' as a reason for discounting results obtained from the interviews in non-Western cultures. For example, in a study conducted in Sierra Leone, Kamara and Easley (1977:37) argued that Themme children's inhibitions naturally limit their display of competence in an interview situation. Hence children are quite likely to be classified as 'non-conservers' because of the culturally accepted reluctance to engage with someone with a more dominant status. Similarly, Irvine (1978) reported that Wolof speakers have different conception of language use. As 'garrulousness' is considered to be vulgar, most Wolof speakers prefer to remain silent unless repeatedly prodded.

2.2 Cross-linguistic differences

In a study on Themme children, Kamara and Easley (1977:33) stressed the importance of the interviewer possessing native-like insight into the language used. They demonstrated the following pitfall of conducting conservation tasks without adequate fluency in Themme where *it must be the same* translated from English literally into Themme is both unidiomatic and awkward. The appropriate translation should have been *one afar cannot have more* (1977:37). In this case, the appeal to necessity and equality of amount is always encoded in the negative. The implication this has for a conservation task is obvious.

Kelly (1977:195) reported the difficulty of finding translational equivalence for the English *food* in Melpa for a class inclusion task. In Melpa, the term *run* normally translated as 'food' means 'prepared for eating' or 'cook'. In another study which focussed on 'concept of life', Laurendeau-Bendavid (1977:140) reported that Rwandan⁴ children in Kigali lagged behind their Montreal counterparts. Montreal children tend to consider an object non-living if the

⁴ The language spoken by the children was not provided by the author.

object is not really useful. In Rwanda the children's definition corresponds rather to the idea of actions that are harmful or beneficial to people; thus certain objects are considered non-living because they are dangerous or malicious or cause bites, wounds, famines, etc. At the same time, life is often seen by these children as related to good health (never to be ill, not to die, not to get hurt).

Huang and Lee (1945) presented data from Chinese children which contradicted Piaget's description of animism. They obtained more animistic answers for the question 'Is X living?' than for the question 'Has X life?' They criticised Piaget's account of animism and causality by focussing on the non-replicability of the data. What is surprising in the ensuing debate on this topic is the lack of discussion of the possibility that those two questions (see examples 1a) and (1b) in Chinese) may have different extensions in Mandarin Chinese see e.g. Klingberg 1957, Klingensmith 1953 and Strauss 1951).⁵

- (1) a. 'Is X living?' is translated as:
X *shì bú shì huó zǎo*
X be neg be live dur
- b. 'Has X life?' is translated as:
X *yǒu méi yǒu shēnmìng*
X exist neg exist life

In (1a) *huó zǎo* 'living' contrasts with *sǐ* 'dead' while (1b) *shēnmìng* means 'life' or 'life force'. This semantic distinction could well be the cause of the increase in animistic responses for (1a) as compared with (1b) in Huang and Lee's study.

Apart from Carey (1985) who commented briefly on the potential confusion caused by the semantic fuzziness of *alive*, no attempts have been made to fully explain the source of this semantic confusion in all the studies reviewed. As indicated by Carey (1985:25) children could be answering the wrong question. They could be attending to any of the following:

- i. the distinction between alive and dead (dead animals, George Washington)
- ii. the distinction between real and imaginary (monsters, fairies)
- iii. the distinction between real object and representation (pictures, people on TV)
- iv. the distinction between objects that are functional and objects that are not (car that is running, stationary car).

Carey's observations highlight the difficulty of assessing children's understanding of specific conceptual domains through their knowledge of labels for these domains. The purpose of the present study is not to establish the replicability of Piaget's 'concept of life' stages as such. Rather, the focus is in locating and explaining the source of semantic confusion that such a task may present.

3. The study

3.1 Participants

The participants are thirty-six 4 to 10 year olds from Wuhan, PRC. Twelve children at each of the three ages (4, 7 and 10) participated in the study. Both males and females were equally

⁵ Here, I assume that the study was conducted in Mandarin Chinese although the authors did not specify exactly which Chinese language was used.

represented in each group. As the children were all from kindergartens and primary schools on the Hua Zhong Normal University Campus, they were predominantly from a middle-class stratum in Wuhan. All subjects speak Mandarin Chinese as a first language. Some of the children also speak Wuhanese, a related dialect as a mother tongue.

3.2 Procedures

Each child was first asked to name some things that are alive and some things that are not. They were then shown A4 size pictures of the following items: mountain, sun, table, car, cat, cloud, lamp, watch, bird, bell, wind, aeroplane, fly, fire, flower, rain, tree, snake, bicycle, and pencil. The order of presentation was randomised for each child. They were asked if each of the items was ‘alive’. After each judgement the children were asked for a justification by inquiring ‘Why?’ or ‘How do you know?’ All the sessions were taped. The interviews were conducted in Mandarin Chinese and all instructions were translated and vetted by 10 native speakers of Mandarin Chinese.

4. Results

The data was scored using the criteria set out by Laurendeau and Pinard (1962). This is presented in Table 2.

TABLE 2: Criteria used by Laurendeau and Pinard (1962) for classifying stages

Stage 0	<p>random or appealing to use, facts or existence</p> <p>Examples:</p> <p>use - <i>A table is alive because you can eat on it</i></p> <p>facts - <i>A mountain is not alive because grass grows on it.</i></p> <p>existence - <i>Trees are alive because I have seen them</i></p> <p>others - <i>I don't know, Mom told me so etc.</i></p>
Stage 1	<p>Movement</p> <p>To be at Stage 1, a child must attribute life to <i>at least one</i> inanimate object and justify <i>at least one</i> judgement with an appeal to activity or movement.</p> <p>Examples:</p> <p>Movement: <i>The car is alive because it moves.</i></p> <p>Activity: <i>The cat is alive because it meows and cries.</i></p>
Stage 2	<p>Autonomous movement</p> <p>To be at Stage 2 the child must attribute life to <i>at least one</i> inanimate object and justify <i>at least one</i> judgement with an appeal to autonomous movement.</p> <p>Example:</p> <p><i>A bicycle isn't alive because you have to pedal it.</i></p>
Stage 3	<p>Adult-like</p> <p>Only animals and/or trees are alive.</p>

Table 3 presents the percentages of children in each stage for this study. As can be seen in Table 3, very few children (n=5) fall into Stage 3. This means that 31 out of 36 (86%) children attributed life to at least one inanimate object. The findings also indicate clustering of children in Stages 1 and 2. Note the unusually high percentage of 10 year olds in these two

stages. When compared to Laurendeau and Pinard (LP) and Carey’s study (C; see Table 4), the results in this study (Ng) stand out in striking contrast

TABLE 3: **Percentage of children in each stage**

	Stages			
Age	0	1	2	3
4	25 (n= 3)	75 (n= 9)	0 (n= 0)	0 (n= 0)
7	0 (n= 0)	33 (n= 4)	42 (n= 5)	25 (n= 3)
10	0 (n= 0)	42 (n= 5)	42 (n= 5)	16 (n= 2)

TABLE 4: **Percentage of children in each stage**
(Comparison of the 3 studies)

Age	Stage 0			Stage 1			Stage 2			Stage 3		
	C	LP	Ng	C	LP	Ng	C	LP	Ng	C	LP	Ng
4	60	73	25	10	23	75	10	4	0	20	0	0
7	0	8	0	10	43	33	40	10	42	50	39	25
10	0	0	0	20	22	42	30	24	42	50	54	16

Despite the small sample size in Carey’s study, the agreement between her findings and Laurendeau and Pinard was substantial. Over half of their 4-year olds are in Stage 0 and over half of their 10 olds are in Stage 3. In contrast, only 25% of the 4-year olds in the current study are in Stage 0. More significantly, a high percentage of each age group can be found in Stage 1. The similarly high percentage of 7-year olds and 10 olds in Stage 2 (42% in comparison to Carey and Laurendeau and Pinard) is also noteworthy. None of the 4-year olds in this study are in Stage 3 and only a small percentage of the total sample (25% for 7 olds and 16% for 10 olds) falls within Stage 3. On the whole, Table 4 indicates that the Chinese children in this sample lag behind both Carey’s and Laurendeau and Pinard’s children. More Chinese children attribute life to inanimate objects than in the other two studies.

In a critique of the criteria established by Laurendeau and Pinard, Carey (1985:24) pointed out that the actual number of animistic judgements of inanimate objects could in fact be very low as the child only need assign life to one inanimate object to be placed in Stage 1 or Stage 2. Therefore, a child who responded in an adult like manner for 19 trials but attributed life to ‘sun’ and provided ‘movement’ as the justification will be relegated to Stage 1. As a result, the incidence of ‘animism’ may be over-reported if Laurendeau and Pinard’s criteria are strictly adhered to.

In order to filter out this form of over-reporting, Table 5 presents the total percentage of all judgements of inanimate objects that were ‘animistic’. The findings indicate a higher number of ‘animistic’ judgements for the Chinese children for the older age groups. The findings suggest that there is a positive correlation between increase in age and increase in ‘animistic’ responses. The ten olds in this study made more animistic responses than the 4-year olds.

Nonetheless, Gelman, Spelke and Meck (1983) argued that the tendency towards animistic responses could have been induced by the presence of unfamiliar inanimates such as *sun*, *wind*, *cloud* and *rain* in the trials. In Tables 6 and 7 the above items (henceforth referred to as

the ‘sun-wind’ category) were isolated from the rest of the inanimates (n=10) to see if the sun-wind items are the main ‘instigators’ of animistic responses.

TABLE 5: **Percentage of all judgements of inanimate objects that were animistic**

	Studies		
Age	Carey	L&P	Ng
4	21 (n= 4)	49 (n= 27)	29 (n= 10)
7	20 (n= 10)	20 (n= 45)	32 (n= 8)
10	11 (n= 10)	16(n=50)	39(n=10)

TABLE 6: **Attribution of movement to inanimates⁶**

	Stage 1	Stage 2
Sun, Cloud, Wind, Rain	40% (29)	25% (18)
Other inanimates	26% (46)	20% (20)

TABLE 7: **Attribution of autonomous movement to inanimates**

	Stage 2
Sun, Cloud, Wind, Rain	23% (9)
Other inanimates	5% (2)

Overall, there is indeed a tendency for the sun—wind category to influence animistic responses, especially, at Stage 2 (see Table 7). However, the number of non sun-wind inanimates (26%) which are attributed with life and movement (see Table 6) is substantially high. A detailed breakdown of the attribution patterns for the sun-wind category versus other inanimates by age groups (see Tables 8, 9 and 10 and 11) shows clearly that the 10-year olds are predominantly responsible for the animistic responses.

TABLE 8: **Attribution of Movement to Sun-Wind category Movement**

	Movement					
	Stage 1			Stage 2		
Age	4	7	10	4	7	10
Sun	0	0	2	0	2	4
Cloud	5	1	5	0	2	4
Wind	4	1	5	0	2	1
Rain	2	1	3	0	2	1
Total	29			18		

⁶ The data in Tables 6, 7, 8, and 9 do not include the children who use movement or autonomous movement as criteria but classify the targets as ‘not alive’.

In Table 8, out of the 29 children who attributed life to the sun-wind category in Stage 1, 15 were from the older 10-year-old age group. Similarly, out of the 18 animistic' responses at Stage 2, 10 were provided by the 10-year olds. Table 9 shows that again, none of the 4-year olds judged sun-wind items to be alive because of autonomous movement.

TABLE 9: Attribution of Autonomous movement to the sun-wind category

Autonomous movement			
	Stage 2		
Age	4	7	10
Sun	0	1	1
Cloud	0	1	0
Wind	0	2	2
Rain	0	1	1
Total	9		

Table 10 presents an interesting picture. While approximately half of the responses (24) at Stage 1 were elicited from 4-year olds, nearly just as animistic responses (20) were elicited from 10-year olds while only two responses were elicited from the 7-year olds. At Stage 2, only the 7 and 10-year olds provided movements as justification for classifying inanimates as Table 11 shows that 10 olds are the only age group which appeal to autonomous movement as a criterion.

TABLE 10: Attribution of Movement to other inanimates

Movement						
	Stage 1			Stage 2		
Age	4	7	10	4	7	10
Other inanimates	24	2	20	0	12	8
Total	46			20		

TABLE 10: Attribution of Autonomous Movement to other Inanimates

Autonomous Movement			
	Stage 2		
Age	4	7	10
Other inanimates	0	0	2
Total	2		

Prima facie, it would appear that the 10-year olds provided more animistic responses than the 4 and 7-year olds. According to the interviews, only three of the Chinese children attain adult concepts where livings things form the superordinate category for plants and animals.

5 Discussion

Generally, the findings here seem to indicate that Chinese children attribute life and movement to inanimate objects more than Carey's and Laurendeau and Pinard's studies suggested. Though the role of the interview protocol in inducing animistic responses has been widely discussed (see Carey 1985:35), this does not account for the markedly higher percentage of animistic responses in the Chinese children compared with other studies which used the same procedure. There are multiple levels of explanation for this discrepancy and they will be reviewed in turn in the following discussion.

5.1 The child as an animist

The view of the child as an animist has been widely discredited in the last 10 or more years by different sources. Keil's (1983) predicability study clearly demonstrates that the predicate *alive* was never extended beyond plants and animals in any of his children ranging from five to nine years of age. Though Keil did not claim that children's representation of the concept of animals and inanimates was adult-like, he was able to demonstrate that the tripartite animal/plant/object distinction is generally observed at the pre-school level. Keil (1983:371) posits that though children may not have the concept *living thing*, conceptual advancement in this domain seemed to be the understanding of the Deordinate notion of *living thing* rather than learning a new category. Learning the principled distinctions for the three categories involves understanding new interpretations of the predicates. This clearly suggests a shift semantic rather than at a conceptual level.

Likewise, several studies (Gelman, Spelke & Meck 1983, Dolgin & Behrend 1984, Golinkoff, Harding, Carlson & Sexton 1984, and Carey 1985) have shown that children as young as three years of age have a concept of animal which is distinct from inanimates. Golinkoff *et al.* (1984) reported that infants as young as 18 months have already formed expectations of what animates can or cannot do. In the face of such abundant evidence which clearly shows that pre-schoolers have a category for animates which are distinct from inanimates, we have to look elsewhere for an explanation.

5.2 Semantics of *huó* 'alive' in Mandarin Chinese

Keil (1986) argued that in acquiring a specific concept (e.g. 'kinship'), terms within a domain shift together. A full understanding of the term 'grandfather' necessarily entails understanding other associated kin terms (e.g. 'mother'). The properties of the domain in question determine the ease and difficulty with which we acquire that knowledge and the representations of such knowledge. Following on from Keil's perspective of concept acquisition, it is viable to speculate that concept change may be influenced to a large extent by representational properties of the language concerned. In fact, the vital role of linguistic modifications to the development of specific conceptual domains such as spatial terms has been widely reported. Several studies (e.g. Choi and Bowerman 1991) have reported on the influence of language-specific lexicalisation patterns on the acquisition of spatial terms. This study proposes that the apparent 'animistic' responses of Chinese children could be explained in terms of the lexicalisation of *huó* 'alive' compounds in Mandarin Chinese.

To begin with, let us examine the two main prototypical uses of *huó* in Mandarin Chinese. On its own *huó* means 'to live'. From this we derive the adjective *huózhe** 'alive'. **Huó** is also typically used in the compound *she#nghuó* to derive the noun *life*. Apart from these two main prototypical uses, *huó* co-occurs with other lexemes to form compounds. Table 12 presents a list of some these compounds, sorted into five main semantic categories according to meaning. The categories are movement or activity, movable parts, work, functionality and approximating reality. There is also a final 'miscellaneous' category for compounds which

elude any neat classification. The list indicates that a high number of *huó* compounds are closely associated with movement or activity (15 out of 32). All the terms in category 1, and 2 make reference to either movement or activity. These terms are all in some form of antonymous relationship with the meaning of *stasis* or *non-movement*. Categories 3 and 4 both encode activity and function and category 5 associates *huó* with ‘things that are real’.

TABLE 12: *huó* compounds

1. Movement! activity		2. Movable parts	
<i>huódòng</i> <i>huópò</i> <i>huóyuè</i> <i>líng huó</i> <i>huóli</i> <i>huóhuǒ</i>	‘activity, exercise’ ‘lively’ ‘brisk& lively’ ‘lively, clever’ ‘vigour’ ‘intense’	<i>huóbà</i> <i>huóbàn</i> <i>huósāi</i> <i>huóyè</i>	‘moving target’ ‘movable letter press’ ‘piston’ ‘loose page’
3. Work/ activity		4. Currently functioning	
<i>huójì</i> <i>gànhuó</i> <i>zhònghuó</i> <i>kǔhuó</i> <i>huómìng</i>	‘labour’ ‘work’ ‘hardwork’ ‘difficult work’ ‘earn a bare living’	<i>huóqí</i> <i>eg.</i> <i>huóqíxiànkǔǎn</i> <i>huóhuǒshān</i> <i>huóbiāoběn</i> <i>huófuó</i>	‘current, not expired’, e.g. current account ‘live volcano’ ‘living specimen’ ‘living Buddha’
5. Approx reality		6. Others	
<i>huóshēnshēn</i> <i>huólínghuóxiàn</i>	‘in real life’ ‘vivid, life like’	<i>huógāi</i> <i>huóbǎo</i> <i>huóbǎnjù</i> <i>huódìyù</i> <i>huóshòuzui</i> <i>huóbàwáng</i> <i>huójiànguǐ</i> <i>jùhuó</i> <i>gǎohuó</i> <i>huómái</i>	‘serve you right’ ‘a funny fellow’ ‘street performance’ ‘hell on earth’ ‘have a hell of a life’ ‘tyrannical ruler’ ‘sheer fantasy’ ‘save’ ‘enliven, to agitate’ ‘to bury alive’

Note that some of these categories coincide with the possible sources of confusion for children’s understanding of ‘alive’ in English identified by Carey (see section 2.1.2).

In the absence of ostensive lexical learning, children frequently infer word meaning from the context in which they occur. Given the different referential meanings of *huó* in Mandarin Chinese, which of these ‘meanings’ are more salient? Could Chinese children be attributing movement as a criterion for inanimate objects because of the frequent association of *huó* with compounds which encode movement or activity? Whether the children in this sample are selectively attending to this aspect of the meaning of *huó* cannot be answered by the findings of the present study. However, there is further evidence which suggests that *huó* ‘alive’ is closely linked with movement. In the following examples, misunderstanding of the terms

dòngwù ‘animals’ (literally meaning ‘moving things’) and *jìngwù* ‘still life’ (as in ‘still life paintings’, literally meaning ‘still things’) by three 10 old children reveals semantic criteria that may be salient to children in this study.

2. Q: *bǐ shì bú shì huó dé?*
Is the pen alive?’

A: *bǐ bú shì huóde yīngwéi bǐ shì *jìngwù*
pen neg be alive, because pen be ***still thing**
The pen is not alive because it is a *still thing.’

3. Q: *zìxíngchē shì bú shì huóde*
‘Is the bike alive?’

A *bú shì, yīngwéi zìxíngchē shì gè *jìngwù*
neg be because bicycle be classifier ***still thing**

zhǐ kěyǐ ràng rén cǎizhè tā cái néng zǒu,
only can allow man step 3sg only can move

ér bú shì zìjǐ néng xiàng qián zǒu
moreover neg be self can towards front move

‘No, because a bicycle is a *still thing, it can only move when it is pedalled by someone, it can’t move ahead on its own.’

4. Q: *tàiyáng shì bú shì huóde*
‘Is the sun alive?’

A: *shì huóde, yīngwéi tā zài zǒudòng, tā bú*
be alive because 3sg durative moving 3sg neg

*xiàng *jìngwù nà yàng bú dòng*
like still thing like neg move.

‘It is alive, because it is moving, it is not like a still thing which does not move.’

Note that the uses of *jìngwù* are asterisked in all the above examples because they are all unacceptable to native speakers in the above context. The children in these examples have inappropriately used *jìngwù* to refer to things that are not moving. When probed further, two of the children provided the justification that *jìngwù* ‘still things’ do not move, unlike *dòngwù* ‘animals’ which do. The third child did not draw any explicit comparison between *jìngwù* and *dòngwù* but listed a few more inanimate objects as examples. Examples (2), (3) and (4) suggest that these children could have mapped a category of ‘living things’ onto *dòngwù* ‘animals’. Since *dòngwù* literally means ‘moving things’ these children may have isolated ‘movement’ as the most salient feature of this category. Whether this is the strategy adopted by other children remains speculative, but at this stage, the weight of the evidence suggests that ‘movement’ is a feature which is encoded more extensively than any other sense components in this domain. Animism in Chinese children’s response could be motivated by the semantic encoding of related terms. It might also be indicative of a more advanced ongoing analysis of the semantic system. It is, therefore, particularly true that for Mandarin Chinese the word *alive* does not provide a direct pipeline to Chinese children’s concept of ‘life’. Conversely, one could argue that semantic development modulates conceptual change in this domain. Thus Chinese children could be predisposed to animism. If so, the commonly held endpoint of development of folkbiology at 12s of age would have to be revised to take cross-linguistic differences into consideration. Subsequent studies employing Keil’s (1983) predicability methodology or Backscheider, Shatz and Gelman’s (1993) paradigm on healing

and regrowth may provide us with the necessary data on Chinese children's knowledge of folkbiology.

Conclusion

While the findings of this paper do not allow us to draw any conclusive statements about the impact of the lexicalisation of associated terms within the 'alive' domain on Chinese children's understanding of the concept of 'life' or 'living things', they serve to highlight the importance of language-specific factors in interpreting folkbiology and folk-psychology research. At the same time, Bowerman and Choi (1994) have also noted that children do ignore spatial notions which are coded in the target language. Though this more recent finding has often been said to 'dilute' the significance of language-specific influences, its more crucial message is that any unilateral explanation is likely to be insufficient to explain something as complex as language development. Another has not been discounted is the possibility of cross-cultural differences. Social and cultural variables were found to be mediating factors in the semantic and conceptual development of Yoruba speakers (Walker Jeyifous 1992). This could be pertinent to the present study which comprises of children from a culture which is substantially distinct from the children in Carey's (1965) and Larendeau and Pinard's (1962) study. More importantly, input data will also be valuable in furthering our knowledge in this area.

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