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William G. Boltz and Matthias Schemmel

Theoretical Reflections on Elementary Actions and Instrumental Practices: The Example of the *Mohist Canon*

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1 Elementary actions, instrumental practices, and theoretical knowledge

This chapter[1] is concerned with an analysis of the small body of texts usually referred to as the *Mohist Canon*, particularly focusing on the sections that are concerned with concepts of space, time, and matter. These texts, written around 300 BCE, constitute one of the most important sources for understanding ancient Chinese thinking about natural and technical aspects of the environment, what is often called 'Later Mohist Science'.[2]

When we call a historical cultural activity 'science', we usually justify this by identifying certain features of the activity as in some way 'scientific'. This practice may relate to such things as the recognition and systematic observation of regularities in the physical world, the explanation of such regularities by causal reasoning or by deductive argument, the use of mathematics, or the production of knowledge by systematic experimentation. In all cases we pick certain features of modern science, which we would not doubt to represent scientific thinking, and on this basis assess the extent to which the historical activities in question qualify as 'science'. In the present study, rather than advocating a certain definition of what 'science' is, we would like to shift the focus to the concept of *theoretical knowledge*, which clearly constitutes an important ingredient of present-day science, but which may also contain kinds of knowledge that under more rigorous criteria would not be called 'scientific'.

One of the ways to characterize theoretical knowledge is by recognizing that it is not directly related to practical problems. Theoretical knowledge may build upon knowledge from practical experience, but it is not pursued with the direct aim of solving practical problems. Somewhat aphoristically one may say that, while the purpose of practical knowledge is the control of action, the aim of theoretical knowledge is the control of knowledge itself. Theoretical knowledge emerges from the reflection on externally represented knowledge. Spoken language is the most obvious example of a means for the external representation of

[1] This text will be published as a chapter in Schemmel forthcoming(a).
[2] Graham 1978.

knowledge. Further examples are drawings, written language, and other symbol systems such as mathematical notation. This immediately explains why animals do not acquire theoretical knowledge; they lack any capacity for the cumulative external representation of knowledge. To be sure, many species do not simply act by stimulus and response but develop elaborate internal knowledge representations. All the same, their mental representations remain bound to the context of action, and there is no evidence of secondary reflection.[3]

In addition to theoretical knowledge there are of course other forms of knowledge. We may distinguish elementary and instrumental knowledge, both of which in some sense precede theoretical knowledge. These different forms of knowledge are distinct in their sources, their inner structure, and their modes of transmission. *Elementary knowledge* is ontogenetically acquired, i.e., as an individual grows to maturity. Since the physical conditions of ontogenesis are largely culture-independent, a great part of this knowledge may be considered universal. An example of an elementary knowledge structure is what developmental psychologists refer to as the schema of an object. By this term they mean the mental construction of entities located in a definite place or moving along a definite spatial trajectory, independent of the self. Possession of the schema includes the ability to perceive objects as having a defined shape and size, regardless of from what changing point of view one sees them, and to know where to look for them when one has seen them vanish.

The relation between space and matter specifically does not first occur in the realm of theoretical reflection but appears as an inherent part of pre-theoretical thinking as a kind of elementary knowledge. In fact, conceptions of space and conceptions of material objects and the relation between the two co-evolve, and in this process space and objects become distinct from each other only gradually. As an illustration of this gradual process of separation consider the experiment in which the Swiss developmental psychologist Jean Piaget (1896–1980) interviewed children of different ages about the distance between two objects depending on whether or not a material barrier was placed between the two objects. A five-year-old child says about the two objects not separated by a barrier:[4]

> They're far apart.

But after the investigator has put a cigar box between the two objects, the child says:

> It isn't far, because there's a wall.

[3] On this issue and the following distinction of forms of knowledge, see the discussion in Schemmel 2013 (to be published as Schemmel forthcoming(b)).

[4] Piaget, Inhelder, and Szeminska 1960, 75.

According to this child's conception, only the 'empty' space between the objects contributes to his perception of them as distant from each other; when the space is filled with material objects, there is no perception of distance.

From experiments of this kind, Piaget was able to conclude that only from an average age of about seven years is distance conceived as being independent from intervening material objects. The environment is then conceived as a huge receptacle in which material objects have their own distinct place. This place changes when objects are moved or are moving by themselves, but no two objects can ever be located in the same place at the same time. Piaget interprets the development of such a conception of the spatial environment as a result of the child's reflection on his or her interactions with the objects of the environment in question.

Piaget seems to assume that this development follows a universal pattern. This assumption is plausible as long as the reflection refers to experiences arising from actions within a universal environment, regardless of historical or cultural circumstances. As soon as specific tools or cultural practices in general are involved, one has to start from the assumption that knowledge structures are culturally dependent, since the handling of cultural artifacts and the performance of cultural practices imply the making of novel experiences. Such experiences lead to the acquisition of practical or, more specifically, *instrumental knowledge*, which is to a large extent expert knowledge acquired in the handling of artifacts such as measuring tools, mechanical instruments, and machines. An example for an instrumental knowledge structure related to the practice of measurement is the additivity of lengths. Anyone who uses measuring rods or ropes knows implicitly that they can be apposed in order to measure lengths or distances greater than the measuring tool itself. This knowledge structure is independent of and may precede any general, or abstract, arithmetical knowledge the user may have.

The structures of elementary and instrumental knowledge do not necessarily find general and consistent expression at the level of linguistic representation. That only comes with theoretical reflection, which entails generality and consistency, giving rise to the appearance and use of abstract terms. *Theoretical knowledge* may thus be described as emerging from the systematic reflection on external representations of knowledge whereby the knowledge represented may be elementary, instrumental, or itself theoretical. We may distinguish different branches of theoretical knowledge according to form and representational type of the knowledge reflected upon. The systematic reflection on linguistic representations of elementary knowledge, for instance, brings about a branch of theoretical knowledge that may be described as *philosophy of space, time, and matter*, a prominent example being Aristotle's *Physics*; the systematic reflection on linguistic representations of instrumental knowledge brings about what is often

referred to as *science*, such as the analytical concern with mechanical and optical phenomena; and the systematic reflection on symbolic representations of instrumental knowledge, including diagrams, brings about what may be identified as the origin of *mathematics*, most prominently Euclid's *Elements*.

Since external representation of knowledge is a universal phenomenon in human cultures – there is, for instance, no human culture without a language – we may ask, is the presence of theoretical knowledge universal too? Does the presence of external representations of knowledge necessarily lead to theoretical knowledge? Based on historical and anthropological evidence the answer lies clearly in the negative. Historical evidence suggests that theoretical knowledge is something very late and very rare in human history. And even in periods and societies where we can document that it existed, it was often only tenuously and marginally maintained. The potential for reflection may, of course, always be realized by individuals. But for theoretical knowledge to become a historical force, the results of individual processes of reflection have to become collectively shared; they have to become part of an enduring tradition. The presence of external representations of knowledge is a necessary but not sufficient prerequisite for the emergence of theoretical knowledge. In addition there must be adequate societal and institutional support in the form of schools, academies, universities, libraries, etc. to sustain a cumulative tradition in which the intellectual achievements are preserved and perpetuated, be it orally or in written form.

Consider philosophical reflections on spatial concepts, which are the focus of this chapter. As evidenced by the various cultural techniques for spatial orientation and their linguistic representation, including the representation of spatial knowledge in mythologies, elementary spatial knowledge had existed in human history long before the advent of theoretical thinking. There are no sources from ancient Egypt or Mesopotamia that document a theoretical reflection on spatial language. The earliest texts documenting such theoretical reflection are found in ancient Greece, starting in the 6th century BCE with the Presocratic philosophers and culminating in the comprehensive Aristotelian natural philosophy. Other historical places that constituted a context for philosophical reflections about space were the neoplatonic schools of late antiquity, court science, philosophy and theology of the Arab Middle Ages, the scholasticism of the Latin Middle Ages, and early modern natural philosophy and practical mathematics. The philosophical activities at all of these historical places find their roots one way or another in Greek antiquity. This is most strikingly demonstrated by the central role of Aristotle's philosophy in Arabic, neoplatonic, and scholastic discussions of space, but can also be seen in early modern references to ancient Greek atomism.

Did then theoretical thinking about space emerge only once in history and then survive as a tradition? Or did it come about several times independently and

was only accidentally influenced by earlier instances of spatial thinking? More broadly we may ask the following questions of the long-term development of spatial knowledge:

- What are the social, material, and intellectual conditions for the emergence of theoretical knowledge on space?
- To what extent is later thinking informed by the emergence of a tradition of such theoretical knowledge in antiquity?
- To what extent are similar structures in theoretical thinking on space the result of the influence of a single tradition, be it diachronically in a single culture or be it across cultures, and to what extent are such similarities an independent consequence of elementary and instrumental forms of thinking?
- What are the social, material, and intellectual conditions for the survival and perpetuation of a tradition of theoretical knowledge?

These are grand questions and addressing them obviously presupposes the comparison of different historical instances on theoretical thinking about space. In particular, historical instances that may be argued to be uninfluenced by the ancient Greek precedent are valuable objects of study in this context. Such instances are very hard to find. Traditions of theoretical reflection of ancient India and China may appear most promising in this respect. In fact, the text that will concern us here, the *Mohist Canon*, is one of very few sources from any culture that document theoretical thinking about spatial concepts independently from the Western tradition. It thus provides us with a particularly revealing and welcome independent source for approaching questions about necessity and contingency in the development of theoretical knowledge as those formulated above. Here we have made a first effort to interpret sections pertaining to spatial concepts within the framework outlined above. After a brief introduction to the text (2), we will discuss sections on space and matter (3), space and time (4), and instruments and arrangements (5). Finally, we shall discuss the epistemic status of Mohist spatial knowledge and argue that it provides an instance of theoretical knowledge parallel to that of Western philosophical considerations about space. At the same time, we shall point out differences between the two traditions and thereby take first steps towards addressing the fundamental questions raised above (6).

2 The *Mohist Canon*

The *Mohist Canon* is contained in four of the seventy-one chapters that make up the Mohist corpus, known generally simply as the *Mozi*. The corpus itself is a compilation of texts, perhaps of disparate origins, that dates in its transmitted form to about 300 BCE. Several centuries later it is ascribed by Han period schol-

ars to what they identify as a 'Mohist school'. The period of the late fifth, fourth and third centuries BCE, known historically as the Warring States Period, is distinguished for the richness of its intellectual ferment and for its growing social and political instability. Numerous texts from this period document the extensive concerns with what we would call social or moral philosophy. To the extent that these texts can be seen as constituting "schools" of thought, they reveal how individual members of the learned classes competed for the attention of rulers across the land and for the consequent status that such attention promised. Argument, disputation and debate, aimed at influencing the ruling elite in matters of both political efficacy and social ethics, was the predominant enterprise of the day. Among these competing factions one group in particular, known traditionally as the Dialecticians (*biànzhě* 辯者), chose to argue from a perspective of logical provocation and an ostensible intellectual rigor, rather than couching their arguments in the more familiar terms of social morality, adherence to tradition, and political expediency.[5] The later Mohists are best known and best documented in the extant textual record for their systematically rigorous response to the Dialecticians. This response is what we find set out in those chapters of the *Mozi* that are known as the *Mohist Canon*.

The *Mohist Canon* deals directly with, among other things, spatial concepts and matters of mechanics and optics. The underlying motive for its compilation seems to have been a desire to set out a comprehensive model of terminological rigor and logical reasoning that could contribute to the Mohists' effective participation in the world of political, ethical and social disputation. In their effort to develop an objective, internally consistent, rigorous terminological scheme of their natural and technical environment the Mohists included not just descriptions, but strove to provide explanations as well. Their extended, probing analysis demanded the kind of thoughtful, reflective consideration that we call theoretical thinking.

Among sources from ancient China, the *Mohist Canon* is one of the most difficult to understand. The Mohist corpus overall contains more unknown graphs than most transmitted texts from the Warring States Period. This is likely due to the fact that it did not undergo as thorough a process of orthographic standardization in the course of its transmission as other texts, because it was not esteemed as a particularly literary work. The problem was compounded for the *Mohist Canon* because of its inherent difficulty. Furthermore, the text was garbled twice in the history of its transmission and has only become coherent and intelligible thanks to the work of twenthieth century scholars. Among these scholars, Liang

[5] In Han-times (206 BCE – 220 CE) the Dialecticians were retrospectively designated as Nominalists (*míngjiā* 名家), i.e., as belonging to the 'School of Names'.

Qichao (1873–1929) and A.C. Graham (1919–1991) stand out as having made exceptional contributions with their respective textual studies.[6]

The first two chapters of the *Mohist Canon* contain about 180 very short passages, the Canons proper, here designated 'C'. Two further chapters contain passages that were recognized by Liang Qichao, among others, in the early 1920s to be Explanations, here designated 'E', matching the Canons.[7] An Explanation is linked to its Canon by means of a head character, i.e., the first character of both canon and explanation is the same. The identity of head character in 'C' and 'E' turned out to be a crucial clue to the overall structure of the text. A Canon together with its co-ordinated Explanation we call a section. In our numbering of sections we follow Graham.[8]

3 Magnitude, filling out, and interstice

Our analysis starts with section A 55.[9]

> A 55
>
> C: 厚，有所大也。
>
> E: 厚：惟端無所大。
>
> C: *hòu* 'having magnitude' means that there is something in relation to which it (i.e., the thing that has magnitude) is bigger.
>
> E: *hòu* 'having magnitude': Only an **end-point** has nothing in relation to which it is bigger.

Hòu, which in everyday language means 'thick' (in the sense of a material, physical dimension), here implies spatial magnitude and is turned into an abstract term that can be used in other definitions or explanations. Thus, a later section reads:

> A 65
>
> C: 盈，莫不有也。
>
> E: 盈：無盈無厚。於尺無所往而不得二。

[6] Liang Qichao 梁啟超 1922; Graham 1978, reprint 2003.

[7] Liang Qichao 梁啟超 1922.

[8] Graham 1978. The Chinese text is as established in Boltz and Schemmel forthcoming, and though we are heavily indebted to Graham's pioneering textual work, our text may sometimes vary from that given in Graham 1978.

[9] The 'end-point' (*duān* 端) occurring in the Explanation line is Graham's emendation; Graham 1978, 305. Here and in the following, terms that are defined in other sections than the one under consideration are marked in bold face.

C: *yíng* ‘being filled out’ is nowhere not having something.

E: *yíng* ‘being filled out’: Where there is no *filling out* there is no **magnitude**. On the measuring rod there is no place to which it extends such that you do not get both (i.e., filling out and magnitude).

The archaeological evidence for the *measuring rod* (*chí* 尺) shows clearly that it came to be a fixed, standard length of about 23–24 cm, typically subdivided into ten equal units. All the same, the word *chí* is used as a concrete way to refer to any short linear measure without necessarily specifying a fixed length.

In this section, the material aspect of the measuring rod appears to be crucial, since it represents the precondition for having magnitude. But ‘filling out’ may also directly be referred to attributes as the immediately following section shows. It introduces the meta-term *jiān bái* 堅白, ‘hard and white’, which was widely used in the disputational and philosophical texts of the Warring States Period.[10]. It stands for the co-occurrence of different and mutually pervasive attributes of a body, as in a stone that is both hard and white at the same time; either attribute may occur or not independently of the other. One can specify *jiān bái* ‘hard-and-white’ as the technical term for “the separation of distinct, but mutually pervasive properties.”[11] It is defined, at first unexpectedly, among terms referring to spatial arrangements, because when understood literally, it refers to features that “fill out each other,” that is, that are co-occurring or coincident.

A 66

C: 堅白，不相外也。

E: 堅白：異處不相盈。相非是相外也。

C: *jiān bái ‘hard-and-white’* is neither excluding the other.

E: *jiān bái ‘hard-and-white’*: (Attributes in general) when occurring in different places, do not **fill out** each other. When attributes are at odds with each other, this means they exclude each other.

The term *excluding* (*wài* 外) is to be understood primarily in terms of spatial exclusion but it also implies logical exclusion. The explanation states that attributes cannot be called *co-occurring* (*jiān bái* 堅白) if they are located on objects in different places, or if they are incompatible or *at odds with each other* (*xiāng fēi* 相非). In other words, the sense of *jiān bái* is delimited in two respects; it requires (a) spatial coincidence and (b) logical compatibility. It follows

[10] See the discussion in Graham 1978, 170–176.
[11] Graham 1978, 171.

that for any two attributes to be in a *jiān bái* 'hard-and-white' relation they must be independent of each other.

As A 65 above suggests, the Mohist notion of space entails a dichotomy of 'filled out' versus 'empty'. That section is part of a series reflecting the Mohist's particular concern with the question of how each of these two features is used to define the other, most clearly illustrated in the following sequence of three sections (A 62, A 63, A 64) dealing with interstices.

> A 62
>
> C: 有間，不及中也。
>
> E: 有間：謂夾之者也。
>
> C: *yǒu jiān 'having an interstice'* is (the sides) not joining at the **center**.
>
> E: *yǒu jiān 'having an interstice'*: refers to what flanks it (i.e., what flanks the interstice).

This section refers not simply to an 'interstice' (that is what we find in A 63), but to the object(s) in relation to which the interstice occurs. This may seem to be in some respects a subtle distinction, but it appears to be for the Mohist important.

> A 63
>
> C: 間，不及旁也。
>
> E: 間：謂所夾者也。尺前於區穴而後於端，不夾於端與區穴。及及非齊之及也。
>
> C: *jiān* 'interstice' is not reaching to the sides.
>
> E: *jiān* 'interstice': refers to what is flanked. Measurements starting from an outline and ending at an **end-point** should not be considered as flanked by the **end-point** and the outline. Those two reachings are not equivalent reachings.

To be able to speak of an 'interstice' you need two flanking objects that are comparable in their capacity to be identified as boundaries of the interstice. Measuring from an outline with a measuring rod and considering the opposite end of the measuring rod as a flanking point does not define an interstice because on one side the measuring rod reaches the outline but on the other it "reaches" only to its own end-point. This is not a genuine 'reaching', hence the two reachings are not equivalent reachings.

The two sections A 62 and A 63 are complementary descriptions of the occurrence of an interstice and what defines an interstice. What remains to be described is the substance of an interstice, and for that the Mohists invoke a concrete example:

A 64

C: 櫨，間虛也。

E: 櫨：虛也者兩木之間，謂其無木者也。

C: *lú* 'king-post', the **interstices** are empty.

E: *lú* 'king-post': What is empty is the **interstice** between two pieces of wood. It refers to the fact of having no wood.

The word *lú* 櫨 means a kind of 'rectangular piece of wood mounted on top of a pillar, as used, e.g., in the construction of a roof beam', what is technically known as a 'king-post'. It may be defined as "a structural member running vertically between the apex and base of a triangular roof truss" (see figure 1.)[12]

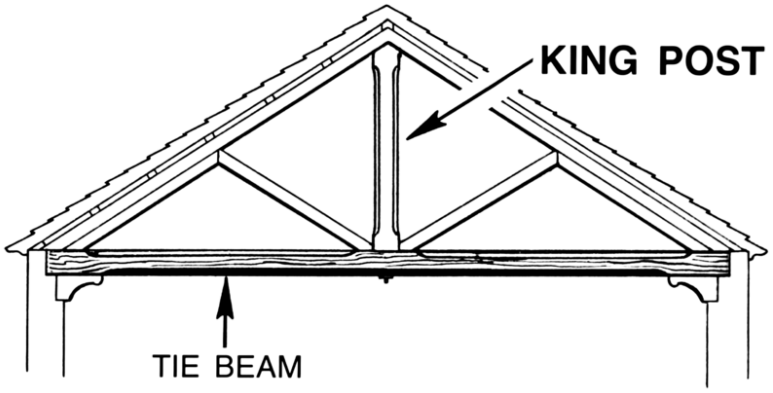

Figure 1: A king post.

The Mohist has recourse to this everyday object to illustrate the relation between an interstice and the material frame that forms it. This takes the understanding of 'interstice' one step beyond the descriptions of A 62 and A 63 in that it explicitly recognizes the interstice as 'empty' (*xū* 虛) relative to the material frame. The Explanation allows for the possibility that the interstice may be filled with a material other than that of the flanking objects.

[12]http://dictionary.reference.com accessed 18 October 2013. The image is taken from http://commons.wikimedia.org/wiki/File:King_post_(PSF).png, last accessed 9 January 2014. We owe the identification of the word *lú* 櫨 as 'king post' to Ian Johnston; Johnston 2010, 428–429.

4 Spatial extent and duration

We begin with the Mohists' definition of 'spatial extent'.

A 41

C: 宇，彌異所也。

E: 宇：東西蒙南北。

C: *yǔ* 'spatial extent' is spanning over different places.

E: *yǔ* 'spatial extent': east-and-west entails north-and-south.

What we translate as 'spatial extent' is in its more traditional context usually understood as 'celestial canopy', a word that generally carries cosmological overtones. Its concrete meaning is 'eaves' of a building, or more particularly, the space defined by the eaves. The sense of east-and-west "entailing" north-and-south is that the two directional spans are not separated from each other as independent manifestations of space, but are rather two different aspects or perspectives of a single comprehensive spatial extent.[13]

The verb *mí* 彌 here meaning 'to span, spread (over, out, through)' with respect to space, is used in a parallel way in the Canon line of section A 40 *jiǔ* 久 'temporal duration', i.e., 'temporal extent', the section that immediately precedes this one in the original Mohist order, given here next.

A 40

C: 久，彌異時也。

E: 久：今古合旦暮。

C: *jiǔ 'enduring'* is spanning different times.

E: *jiǔ 'enduring'*: 'present' and 'past' match 'dawn' and 'dusk'.

Just as *yǔ* 宇 'spatial extent' is expressed in A 41 as a 'span' stretching from one extreme to the other, so this section refers to the extension, or 'span', of time of a specific duration, here illustrated by the example of 'past' and 'present' as an abstract representation of the duration of time correlated with 'dawn' and 'dusk' as a concrete representation. Sections A 41 and A 40 seen in tandem suggest that the general sense of *mí* 'to span, spread (over, out, through)' is applicable both to space and to time.

The close relation that the Mohist sees between spatial extent and temporal duration also becomes clear in other sections. In particular, space and time are related in discussions of motion and rest.

[13] Graham 1978, 294.

A 50

C: 止，以久也。

E: 止: 無久之不止，當牛非馬。若矢過楹。有久之不止，當馬非馬。若人過梁。

C: *zhǐ 'remaining fixed'* means thereby enduring.

E: *zhǐ 'remaining fixed'*: The not-remaining-fixed that lacks duration corresponds to 'ox/non-horse'; like an arrow passing a pillar. The not-remaining fixed that has duration corresponds to 'horse/non-horse'; like a person passing across a bridge.'

Figure 2: The relation between fixed and durative illustrated in terms of the set relation between 'horse' and 'not an ox'.

'Remaining fixed' means 'fixed in place' and is inherently a durative phenomenon; there is no other possibility. But for the relation between 'remaining fixed' and 'not remaining fixed' there are two possibilities: (i) the 'remaining fixed' is durative and the 'not remaining fixed' is punctual or (ii) both are durative. The former is of the "ox/non-horse" type and is exemplified by an arrow passing a pillar, a momentary, punctual event. The latter is of the "horse/non-horse" type and is exemplified by a person crossing a bridge, clearly a durative

event. As the diagram in figure 2 shows, just as the set of 'horses' is a subset of the set of things that are 'non-oxen', but not all 'non-oxen' are 'horses', so the set of 'remaining fixed' phenomena is a subset of the set of 'durative' phenomena, but not all durative phenomena are fixed.

The text's image of "an arrow passing a pillar" is intended to represent the conjunction of 'not being fixed' and at the same time 'not being durative', since clearly a flying arrow is moving and just as clearly its passing a stationary point, here the 'pillar', is perceived as momentary and therefore not durative. Similarly, the image of a person crossing a bridge is just as obviously 'not fixed', and also clearly 'durative'. These two images, together with the original canon statement, represent all logically possible combinations of either fixed or not fixed with durative or not durative. The fourth combination, viz., fixed with not durative, entails a contradiction in terms and is not possible in actuality.

The relation between spatial extent and motion is further illustrated in B 13:

> B 13
>
> C: 宇或徙，說在長。
>
> E: 宇:長，徙而又處宇。
>
> C: **spatial extent**, (allows for) a shifting about somewhere. The explanation lies with 'expanding'.
>
> E: *yǔ* 'spatial extent': as something expands and shifts about it then will occupy further **spatial extent**.

Space is here associated with a capacity for movement in some direction or another. This shows that spatial extent is not only spanning over different places, as explained in its defining entry A 41, but is a necessary aspect of motion and expansion. The immediately following section gives a characterization of the nature of the relation between the extent of space and the duration of time in an explicit, technically phrased statement:[14]

> B 14
>
> C: 宇久不堅白，說在<?>。
>
> E: 宇:南北在旦，又在暮。宇徙久。
>
> C: (The relation between) **spatial extent** and **temporal duration** is not of the **hard-and-white** type. The explanation lies with <?>.
>
> E: *yǔ* 'spatial extent': South and north exist in relation to the dawn and also exist in relation to dusk. Within **spatial extent**, shifting about (entails) **temporal duration**.

[14] The question mark ('<?>') indicates a defective text.

The hard-and-white relation type (*jiān bái* 堅白) is defined as that relation in which one attribute may occur or not independently of the other (see above). But spatial extent exists in connection with the period of the dawn, and again separately in relation to the period of dusk. Furthermore, spatial extent is defined as that which allows for a shifting about (see B 13 above), and because shifting about entails temporal duration, spatial extent therefore has a dependent relation to temporal duration. So 'spatial extent' and 'temporal duration' are not independent attributes, but are inherently linked. Thus they are not of the hard-and-white type. Yet there is a hard-and-white type relation that holds between temporal and spatial concepts, as the following section shows.

B 15

C: 無久與宇堅白，說在因。

E: 無:堅得白必相盈也。

C: (The relation between) 'being without duration' and **spatial extent** is of the **hard-and-white** type. The explanation lies with the criterion.

E: *wú*: When the hard entails the white, each necessarily **fills out** the other.

The Explanation states that the hard-and-white relation type means that the two attributes are mutually pervasive, each attribute filling out the other, i.e., each is co-incident with (but independent of) the other. The fact of being mutually pervasive is the criterion referred to in the Canon. The relation between the absence of temporal duration, i.e., being temporally punctual, and spatial extent is said to be of this type. Section B 14 has just made clear that the relation between *yǔ* 宇 'spatial extent' and *jiǔ* 久 'temporal duration' is not of the hard- and-white type. We now have in a sense the complement to that, the relation between a 'point in time' (*wú jiǔ* 無久 'being without duration') and *yǔ* 宇 'spatial extent', which is said to be of the hard-and-white type. This implies that a single point in time is conceived of as filling out the whole of space, and in this respect the criterion of being mutually pervasive is met, yet neither of the two is contingent on the other; there is no dependent relation between spatial extent and a moment in time. At each moment in time there is a spatial extent being filled out by it and filling it out, somewhat anachronistically we may term them spaces of simultaneity. Different spaces of simultaneity (for instance the one existing at dawn and the one existing at dusk) are related by the shifting from one to the other, which entails duration, thereby establishing a dependent relation between temporal duration and spatial extent (B 14).

B 16

C: 在諸其所然，未然者。說在於是。

E: 在：堯善治，自今在諸古也。自古在之今，則堯不能治也。

C: Locating something in relation to where (temporally) it is properly so, or where (temporally) it has not yet become so. The explanation lies with being in relation to this (appropriate or inappropriate time).

E: *zài 'locating'*: "Yao is good at keeping order." This is, from a present perspective, locating it in the past. If one were, looking from a past perspective, to locate it in the present, then it would mean that Yao is not able to keep order.

The point seems to be that there is a non-arbitrary relation between events and time. Events are spatial occurrences and by the same token they occur over time. Therefore they are characterized as having both a 'spatial extent' (*yǔ* 宇) and 'temporal duration' (*jiǔ* 久), and this pairing is, according to B 14, not of the hard-and-white type. This means that the two features 'spatial extent' and 'temporal duration' as they pertain to events (such as Yao keeping order) are dependent in some way each on the other; events are temporally contingent and therefore are not independent of the time in which they occur; thus the example regarding Yao. When located in the proper time he is good at keeping order (an event that is historically recognized, even if legendary from a modern perspective), located in an inappropriate time, he is unable.

5 Instruments and arrangements

As the mention of the measuring rod in A 65 above indicates, we find, besides the reflection on elementary spatial knowledge, also reflection on the kind of instrumental knowledge acquired through the use of tools in the ordering of space. The following section, for instance, in which a circle is defined, reflects the use of the compass.

A 58

C: 圜，一中同長也。

E: 圜：規寫攴也。

C: *yuán* 'circle' implies (from) a single **center**, **being of the same length**.

E: *yuán* 'circle': When drawing with a compass, it is the simplest form.

'To be of the same length' and 'center' are defined in sections A 53 and A 54, respectively:[15]

A 53

C: 同長，以正相盡也。

E: 同：楗與框之同長也正。

C: *tóng cháng* 'being of the same length' means that by being laid straight (next to each other) each **exhausts** the other.

E: *tóng* 'the same': A door barrier-post and a door frame being of the same length is (an example of) being straight.

A 54

C: 中，同長也。

E: 中：自是往，相若也。

C: *zhōng* 'center' implies **being of the same length**.

E: *zhōng* 'center': extensions starting from this match one another.

The above definition of a circle (A 58) goes hand-in-hand with that of a rectangle in A 59 following.

A 59

C: 方，匡隅四雜也。

E: 方：矩見攴也。

C: *fāng* 'rectangle' implies that the frame corners number four and are closed up.

E: *fāng* 'rectangle': When drawing with a carpenter's square, it is the simplest form.

The Canon would seem to allow for any kind of quadrangle; only the Explanation by virtue of invoking the carpenter's square excludes all such that do not consist of only right angles. In normal parlance, of course, both the word *fāng* 方 and the word *kuāng* 匡 'square-frame basket' would only be used for rectangles.

In several sections on spatial arrangements of objects, the concept of a dimensionless end-point, which is introduced in section A 61, plays a constitutive role.[16]

[15]The term *jìn* 盡 'to be exhaustive' used in section A 53 is defined in section A 43 (which is not included in this selection) as meaning "that nothing is not so" (莫不然也).

[16]Note that the Chinese term *duān* 端 is used just as English 'end-point', to refer equally to the 'starting point' as well as the 'termination point' of a line or rod. A rod has two ends, a front end and a back end. Etymologically the word *duān* in fact suggests a beginning rather than an ending, as is explicitly indicated in this passage.

A 61

C: 端，體之無厚而最前者也。

E: [null.]

C: *duān* ‘end-point’ is the **element** that, having no **magnitude**, comes foremost.

E: [null.]

Not only do we have the notion of a dimensionless point, but that notion is analytically identified as a part of a network of specialized terminology, as the following passage illustrates.

A 2

C: 體，分於兼也。

E: 體：若二之一，尺之端也。

C: *tǐ ‘element’* is a part of a composite whole.

E: *tǐ ‘element’*: like one of two; an **end-point** on a measuring rod.

A *tǐ* 體 ‘element’ is not just an accidental or random part of a whole, like a piece of broken chalk, but is a ‘separable component’ of an analyzable whole. The word *tǐ* is cognate with the word *lǐ* 豊 ‘ritual vessel’ and by extension with homophonous *lǐ* 禮 ‘ritual, ceremony’. The semantic implication is that just as a *lǐ* 豊 ‘ritual vessel’ is a meaningful physical component with a precise, well-defined position and function in a *lǐ* 禮 ‘ritual or ceremonial performance’ (cf. *zhì* 鬯 ‘the proper order or sequence of ritual vessels in a ceremonial performance’), so a *tǐ* 體 ‘element’ is a meaningful component in any composite whole, whether concrete or abstract, of a quotidian, non-ceremonial nature.

The Mohists recognize four different linear relations illustrated by the arrangement of two measuring rods, all dependent on the concept of a dimensionless end-point as identified in A 61 above: (i) extending to an equal length in opposite directions from a common end-point (A 60), (ii) overlapping (A 67), (iii) lying side by side to allow comparison (A 68), and (iv) being contiguous (A 69).

A 60

C: 倍，為二也。

E: 倍：二，尺與尺俱去一端，是無同也。

C: *bèi* ‘doubling’ is making two.

E: *bèi* ‘doubling’: ‘two’ means a measuring rod together with another measuring rod both extending (linearly) away from a single **end-point**, in this case (i.e., the case of doubling), they will have no shared portion.

The general notion of ‘doubling’ is illustrated very concretely in linear terms by explaining that two identical measuring rods laid end-point to end-point (in a straight line) such that there are no coincident points will give a doubled length.

A 67

C: 攖，相得也。

E: 攖：尺與尺俱不盡，端與端俱盡，尺與端或盡或不盡。堅白之攖相盡，體攖不相盡。

C: *yīng ‘overlapping’* means each entailing the other.

E: *yīng ‘overlapping’*: is when a measuring rod is put together with another measuring rod such that neither is **exhausted**, or when an **end-point** is put together with another **end-point** such that both are **exhausted**, or when a measuring rod is put together with an **end-point** such that one is **exhausted** and one is not. When attributes of the **hard-and-white type** (*jiān bái*) overlap they **exhaust** each other. When **elements** (by contrast) overlap they do not **exhaust** each other.

This section shows *tǐ* 體 ‘element’ as part of the Mohist’s specialized terminology used to establish a distinction between two different kinds of ‘overlapping’. The first example of the Explanation depicts ‘overlapping’ in the most straightforward way, one thing partially coinciding with another. The ‘overlapping’ of independent and coinciding attributes, i.e., attributes of a *jiān bái* type by contrast must by definition be exhaustive because they “fill out” each other, just as the overlapping of two end-points will be exhaustive. Similarly, the two elements (*tǐ* 體) referred to in the last phrase of the Explanation must be elements of a single object, and their overlapping corresponds to the overlapping of the two measuring rods of the first line, except now we see that an ‘element’ is understood in an abstract sense, just as *jiān bái* is the abstract counterpart to the end-point.[17]

A 68

C: 仳，有以相攖，有不相攖也。

[17]Section A 2 exemplified a *tǐ* ‘element’ as an ‘end-point’, yet the overlapping of two end-points cannot be the same thing as the overlapping of two elements, since both elements must belong to a single object, and it is impossible that two end-points of a single object could ever overlap.

E: 仳：兩有端而後可。

C: *bǐ* ‘side-by-side comparing’ means that there is a part where (two things) **overlap** one with the other and a part where they do not **overlap**.

E: *bǐ* ‘side-by-side comparing’: Only when the two have a (coincident) **end-point** is this possible.

It is possible, of course, to lay two measuring sticks side by side such that they partially overlap and partially do not, but unless they are positioned such that one end of one of them coincides with an end of the other, there is no meaningful comparison. The explanation of the canon here makes it clear that *bǐ* ‘side-by-side comparing’ must be of this ‘coincident end-point’ type.

A 69

C: 次，無間而不相攖也。

E: 次：端無厚而後可。

C: *cì* ‘contiguous’ is having no **interstice** but not **overlapping** one with the other.

E: *cì* ‘contiguous’: Only because the **end-point** has no **magnitude** is this possible.

This section shows that the notion of contiguity is possible only because end-points are without magnitude, i.e., dimensionless. Were that not the case, there would have to be either an interstice or an overlapping.

Further sections that may well be related to instrumental knowledge are A 52, A 56, and A 57. Their relation to the use of instruments remains a conjecture because there are no extant Explanations to the Canons.

A 52

C: 平，同高也。

E: [null.]

C: *píng* ‘being level’ means being of the same height.

E: [null.]

While it remains questionable if this passage is related to the use of leveling instruments, the following two passages are probably related to the use of gnomons.

A 56

C: 日中，正南也。

E: [null.]

C: *rì zhōng* ‘the sun at the center’ is being due south.

E: [null.]

A 57

C: 直，參也。

E: [null.]

C: *zhí* ‘to be straight’ is to be in alignment.

E: [null.]

In the case of A 56, the ‘center’ refers to the mid-point on the sun’s trajectory between rising and setting, which would have been determined with a device such as a gnomon or sundial. ‘To be in alignment’ *cān* 參 is the standard term in Chinese astronomy for aligning two gnomons with an observed heavenly body.[18] Given the astronomical context of A 56, the reference to astronomical practice in A 57 seems plausible.[19]

6 The epistemic status of Mohist spatial knowledge

We have claimed that the spatial knowledge documented in the *Mohist Canon* presented in the foregoing sections results from systematic reflections on the linguistic representation of elementary and instrumental knowledge and therefore constitutes a genuine case of theoretical knowledge. Let us now analyze the reflective character of this knowledge in order to corroborate this claim and to understand better how the different forms of knowledge interact and thereby shape the theoretical knowledge.

First of all, the representation of knowledge in the *Mohist Canon* clearly documents second order knowledge, i.e., knowledge resulting from reflections on the representation of knowledge. Thus, the majority of sections we encountered can be identified as definitions, statements that delineate the meaning of specific terms, which are then consistently used. The network of defined terms used in the sections discussed in this chapter is shown in Figure 3.

[18] Graham 1978, 307.

[19] Beyond this, *cān* 參 refers to the three stars of the constellation Orion that in their linear arrangement are identified as Orion’s ‘belt’.

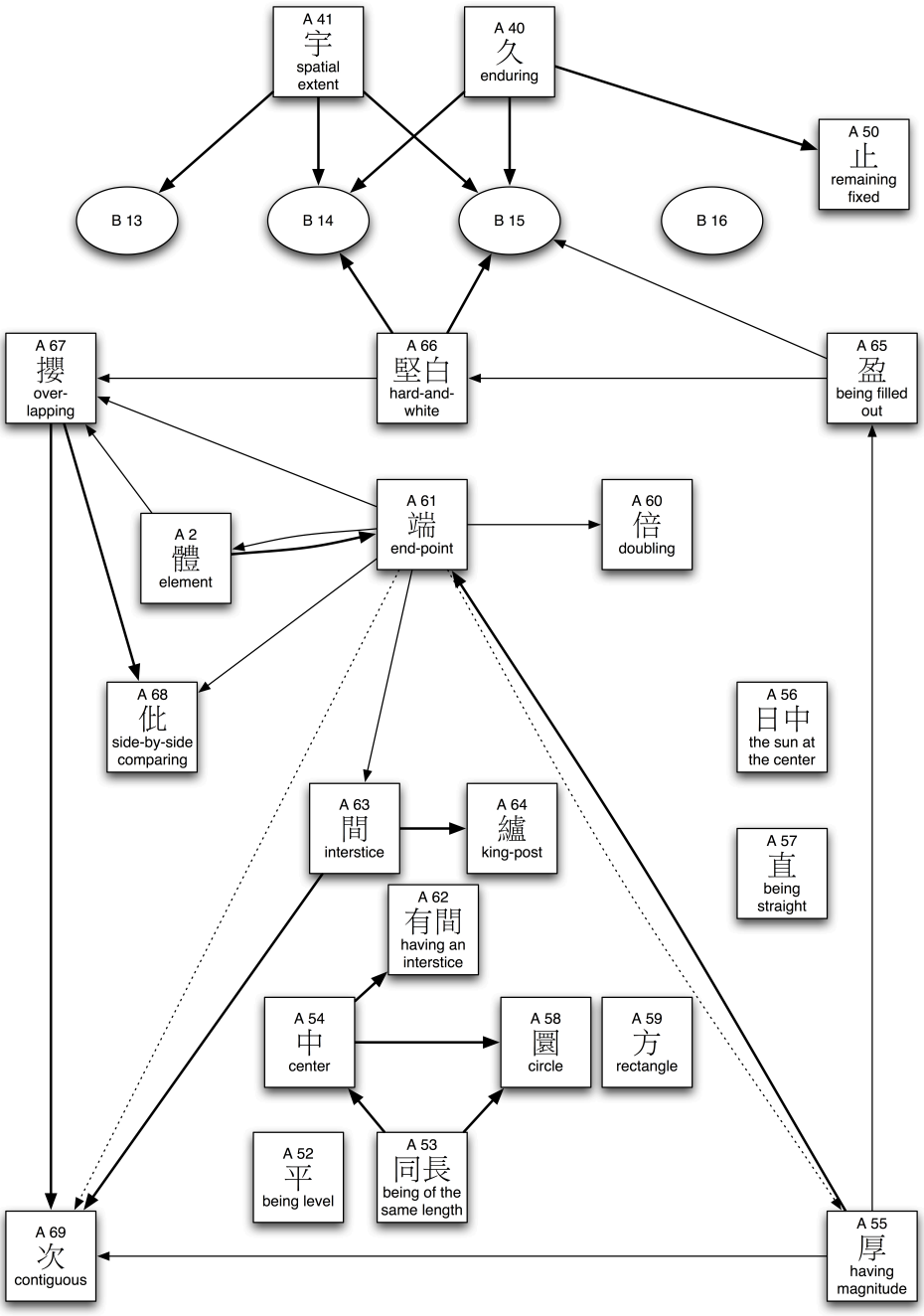

Figure 3: Terminological relations between sections on space, time and matter. Definitions are represented by squares, propositions by ovals. A bold arrow indicates that a defined term is used in the Canon of another section, a thin arrow that it is used in the Explanation. Dotted arrows indicate that the occurrence of the term is only conjectural.

By their participation in a network of definitions, the terms become technical and, to different degrees, abstract. This is an important aspect of the transformation of meaning that takes place when concepts structuring elementary and instrumental knowledge are transferred to the realm of theoretical knowledge. While fundamental aspects of the relevant cognitive structures may be preserved in such transformations, theoretical knowledge inevitably brings about meanings alien to elementary and instrumental knowledge.

Let us, by way of example, look more closely on the relation of space and matter. As explained in the introductory section, within elementary knowledge, space and matter are inherently related ideas. Spatial concepts such as that of distance only gradually become separated from the material fillings of a space, such as an interstice between two bodies. In particular, ideas about being empty and being filled may have an impact on the perception of the extent of an interstice.

How does the relation between space and matter translate into theoretical knowledge? In the case of the *Mohist Canon*, we have a pair of concepts, *hòu* 厚 'having magnitude' (being extended) and *yíng* 盈 'filling out', that consistently differentiate the material and the spatial aspects of bodies. These are the terms defined in sections A 55 and A 65. While we have seen that the distinction between spatial and material aspects of bodies emerges in elementary knowledge, the systematic separation of the two and the reflection on their relation is clearly an aspect of theoretical thinking. Thus, the Explanation provided for the definition of 'having magnitude' refers to the *duān* 端 'end-point', a theoretical entity defined in section A 61. And the Explanation for the definition of 'being filled out' (A 65) shows that magnitude is an inherent feature of physical objects and states that spatial magnitude cannot occur without a material filling out.

In a similar manner, sections A 62 and A 63 differentiate *yǒu jiān* 有 間 'having an interstice' and *jiān* 間 'interstice'. The Explanation for the definition of 'interstice' clearly demanding that the flanking things that *have* the interstice are material: the interstice, which may be gauged by means of a measuring rod, reaches from the outline of one such flanking object to that of the other. (The end-point of a measuring rod cannot be taken as the other extreme of an interstice, as the Explanation of A 63 makes clear.) Section A 64 then relates the concept of interstice to that of emptiness, stating that the interstice being empty refers to its lack of the material the flanking objects are made of.

The Mohist statement (A 65) that being filled out is a necessary precondition to having magnitude is reminiscent of Western theories of space and matter that claim that extension is a property of bodies alone, not of an alleged space independent of bodies. In a certain way, all theories that hold that space is nothing but an aspect of body maintain this view. Aristotle, for instance, extensively discusses the idea of the void as a place from which all bodies have been removed, and

concludes that such void cannot exist, thereby refuting ideas about space formulated by the atomists Leucippus and Democritus.[20] A particularly radical version of this view is found in Descartes' claim that body and space are only two aspects of the same and that the walls of a vessel would be contiguous if the vessel were empty in the philosophical sense, since between its walls there would be nothing.[21]

But is the Mohist statement actually referring to such a world view, denying extension where there is no bodily filling? The every-day meaning of the term here translated as 'magnitude' (*hòu* 厚) and defined in A 55, 'to be thick', suggests that this is really about the magnitude of material objects, not about the question if the abstraction of extension still makes sense when what is abstracted from are bodies in general. In other words, it appears that the Mohist text is actually concerned with the clarification of the use of words, rather than making a claim about the existence or non-existence of space as an entity independent of bodies. If this interpretation is correct, A 65 merely states that the word 'magnitude' applies only where there is body ('filling out'). This interpretation is corroborated by the fact that a term potentially referring to spatial extension without regarding the bodies filling space is given elsewhere in the text: the 'spatial extent' (*yǔ* 宇) of section A 41. After all, this 'spatial extent' is defined as spanning over different places, not over bodies. It therefore appears amenable to a concept of space abstracted from all bodies, but this latter abstraction is also nowhere made explicit in the text.

Correspondingly, the canon A 65 on 'being filled out' seems not so much to introduce a universal material plenum, but rather to aim at complementing the immediately preceding canon dealing with the empty interstices characteristic of the structural functioning of a *lú* 櫨 'king-post'. The 'interstice' is a spatial extension described as lacking a given material, i.e., it is the part that has no wood and therefore is said to be *xū* 虛 'empty'. 'Magnitude', by contrast, is a spatial extension that is always accompanied by some material 'filling out'. The view implied by the Mohist definitions allows for the co-occurrence of an interstice and a magnitude, in that the material between the flanking objects defining the interstice can have magnitude.

It seems that there was no need for the Mohist to position himself in an argument about whether the world was a plenum or whether a perfect void existed. From all we know, such debate of physical world views was indeed absent from the disputations in Warring States China. Thus, the *Mohist Canon* shares with Aristotle's *Physics* a concern with the consistent use of terminology, and both texts particularly deal with spatial terms in this context. Accordingly, in both

[20] Aristotle *Physics* IV, 8.
[21] Descartes 1984, 47–48 (Descartes, *Principles of Philosophy*, Part 2, § 18).

texts we can discern elementary structures of spatial knowledge, such as that differentiating the materiality from the extension of a body. In Aristotle there is the additional concern about the correct natural philosophy. Aristotle explicitly refutes not only what he considers errors of argumentation, but world views that he rejects, such as atomism. In the Mohist case there are no such world views either expressed or rejected.

The discursive context of the *Mohist Canon* is not so much related to systems of natural philosophy but to rules for consistent reasoning in general. This context is reflected not only in the sections on concepts of knowledge, reasoning, and moral conduct, but also in those on spatial, mechanical, and optical terms.[22] In the case of spatial terminology this relation becomes particularly clear from the central role of the term *jiān bái* 堅白 'hard and white', which is used as a technical term in Warring States disputations. The definition of the term in A 66, in particular, reflects the close entanglement of logical and spatial arguments when the term *wài* 外 'excluding' is used in a spatial and a logical sense at the same time. Attributes are said to be of the 'hard and white' type when they fill out each other and are compatible, i.e., they spatially coincide and do not logically exclude each other. In the Aristotelian tradition, attributes pertain to bodies, or substances, while these bodies or substances then occupy a certain place.[23] Logical and spatial exclusion are discussed separately. No substance can have mutually exclusive attributes, and no two substances can be in one and the same place at the same time.[24] In the Mohist text, the argument appears to be that contradictory attributes cannot be in the same place. The section thus reflects the elementary knowledge structure of the schema of an object, i.e., no two objects can be in the same place at the same time, but it does so not by referring to some notion of an impenetrable body, but by the observation that contradictory attributes cannot exist unless in different places.

Besides a concern with the relation between spatial and material concepts, the Mohist text reflects on the relation between the concepts of spatial extent and temporal duration. The Mohist definitions of spatial extent and temporal duration (A 41 and A 40, respectively) are constructed in parallel. The use in both cases of the verb *mí* 彌 'to span, spread (over, out, through)' clearly indicates that the Mohist conceives of space and time as comparable in that both are extended. The peculiar use of the verb *zài* 在 'to locate' in a temporal context in B 14 and B 16 underlines this parallelism.

[22] Graham 1978; Renn and Schemmel 2006, Boltz 2006; Boltz and Schemmel 2013.
[23] Thus, according to Aristotle's *Categories*, for instance, quality and place are two different ways of predicating that which exists; see Rapp 2001, 82.
[24] This becomes clear from Aristotle *Physics* IV, for instance at 209a, 7–8 (Aristotle 1993, 282).

Extension is arguably the most basic structural similarity between space and time.[25] More generally, there is strong evidence that a certain parallelism between spatial and temporal concepts is a universal aspect of elementary knowledge. Spatial metaphors used for temporal designations in everyday language, for instance, are a cross-linguistic phenomenon.[26] It is a typical aspect of theoretical reflection that such structural parallelism within elementary knowledge becomes explicitly addressed on the level of technical terminology. A parallel case to the Mohist passages can again be found in Aristotelian discussions of space and time.[27]

The Mohist theoretical reflection on the relation between spatial extent and temporal duration again makes use of the concept of 'hard and white'. Thus, spatial extent and duration are said not to be of the 'hard and white' type (B 14). The reason is that they are not independent. Motion is invoked as an argument for this dependence: shifting about implies the occupation of further space (B 13) and takes time (B 14). As a matter of fact, section B 14 seems to suggest the possibility that exemplars of spatial extent can shift through time, *viz.*, the north-south extent from one instant (dawn) in time to another (dusk). Spatial extent and lacking duration, by contrast, are said to be as 'hard and white' (B 15), since an instant fills out the spatial extent and vice versa.

While the particular form of the argument is specific to its cultural context, exemplified by the central role of the analytic tool of 'hard and white', there are structural commonalities to the spatio-temporal reasoning documented in the Western tradition. The idea that spatial and temporal magnitudes are related by motion, for instance, is also found in ancient Greek philosophy. As an example we may refer to Aristotle's discussion of the speed of local motion, in which the time of a motion is related to the space traversed.[28] Again, there is evidence that the connection of temporal and spatial measures via motion precedes theoretical thinking. In fact, the separation of the temporal from the spatial order in the consideration of motion is only gradually achieved in the course of ontogenesis.[29]

Despite the parallelism between space and time, there is an asymmetry in their relation as described by the Mohist. It is of spatial extent and lack of duration that the Mohist claims the relation to be of the 'hard and white' type, but not of duration and lack of spatial extent. Thus, while one instant in time fills out all spatial extent, the inverse seems not to be the case (a spatial point filling out

[25] Galton 2011.

[26] See, for instance, the recent discussion in Evans 2013. For evidence that the parallelism between space and time is not only a linguistic, but a cognitive, phenomenon, see, for instance, Boroditsky 2000 and Casasanto and Boroditsky 2008.

[27] Aristotle, for instance, describes time and space (place) as quantities related by the fact that they are both continuous, an attribute that presupposes extension; *Categories* 4b, 24–25 (Aristotle 1983, 36).

[28] *Physics* 232a, 23 – 232b, 15 (Aristotle 1993, 103–115). See further *Physics* IV, 11.

[29] Piaget 1946, Chapter 3.

all of time). Therefore it is instances of spatial extent that shift through time. The asymmetry may be explained by the fact that within spatial extent, motion is conceivable as well as rest. In time, by contrast, there is no rest, spatial extent and all it comprises inevitably move from one instant to the next. This attribute of time, which is not an attribute of space, has been described as *transience*.[30] In his *Physics*, Aristotle addresses this aspect of time when he "speaks of the now as progressing through time in a way comparable to that of a body progressing through a movement […]."[31]

While the concept of an instant or a 'now' has a clear enough sense in elementary thinking, in the realm of theoretical reflection it may become problematic when related to the concepts of motion and rest. In Zeno's famous paradox of the flying arrow, this problematic relation is employed when it is argued that the arrow cannot move during an instant and therefore cannot move at all. Aristotle tries to resolve this paradox by arguing that, in the 'now', there is neither motion nor rest.[32] In the Mohist case, the discussion of the instant, *wú jiǔ* 無久 'lacking duration', implies that it is compatible with *bù zhǐ* 不止 'not remaining fixed', which, for the Mohist, is equivalent to being in motion, as the example of an arrow passing a pillar suggests. It is incompatible with *zhǐ* 止 'remaining fixed', since, according to A 50, being fixed demands duration. So, while Aristotle responds to the problem by denying instantaneous motion and rest, the Mohist responds otherwise. This shows that what seems intuitively obvious at the elementary level becomes problematic at the theoretical level.

Just as the the everyday concept of an instant becomes refined in the context of theoretical thinking about motion and rest, the everyday concept of an end-point becomes refined in the context of theoretical thinking about the possible arrangement of measuring rods. Sections A 60 and A 67–69 explaining different spatial arrangements of measuring rods all rely, in one way or another, on the definition of the end-point. In A 67 we see the consideration of all possible two-item combinations of an end-point and a measuring rod, including the intuitively least obvious case of two coincident end-points. The Explanations in A 68 and A 69 both explicitly say that the configuration specified in the Canon is only possible (*ér hòu kě* 而後可) because of the particular nature of the dimensionless end-point. The definition of the end-point as something dimensionless (A 61) is clearly a result of its role in the network of concepts and can only be formulated within this network. Despite its derivation from an instrument of practical relevance – the measuring rod – the Mohist 'end-point' is therefore a typical theoretical entity. The end-point's lack of extension is conceived of as absolute, which shows that

[30] Galton 2011.
[31] Owen 1976, 15; the passage referred to is *Physics* 219b, 22–33.
[32] *Physics* 239b, 1–2.

the concept does not reflect an elementary experience or a concrete perception, but a reflection on the linguistic representation of instrumental actions.

In the context of reflections on instrumental knowledge, the Mohist defines further geometrical objects such as the circle or the rectangle. Some of the Mohist geometrical definitions are strikingly reminiscent of parallel definitions in Euclid's *Elements*. Thus, Euclid defines a point as "that which has no part," and a circle as[33]

> a plane figure contained by one line such that all the straight lines falling upon it from one point [later called the center] among those lying within the figure are equal to one another[.]

The similarity of this with the Mohist definition of a circle (A 58), definitions that were certainly arrived at independently, may be explained by the similarity of the underlying practical knowledge. In both societies (Warring States China and Classical Greece), the compass, to which the Mohist Explanation of A 58 makes explicit reference, was a well-known instrument. Despite this similarity in the definitions, there is no counterpart found in the Mohist text to the Euclidean propositions. The *Mohist Canon* documents reflections on the linguistic representations of instrumental knowledge, but not on their symbolic or diagrammatic representation, such as the construction of complex figures that can be drawn with straightedge and compass. This means it is more philosophical than mathematical, and thus more Aristotelian than Euclidean, in the sense described at the outset.

The near-simultaneous but independent appearance of texts documenting theoretical thinking in Greek and Chinese antiquity raises the question how we might account for this coincidence. Are there identifiable factors that led to this development? This question becomes all the more interesting and all the more consequential when we recognize that the appearance of texts clearly representative of theoretical thinking is a markedly uncommon phenomenon in the ancient world. Whatever form a complete answer to this question might eventually take, here we can observe that both cultures, Greek and Chinese, had thinkers who characteristically constructed paradoxes as inherent parts of their arguments, the Sophists in Greece and the Dialecticians in China.[34] The dynamics of disputation resulted in both cases in a tendency to establish comprehensive doctrinal systems using consistent terminology.

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[33] Euclid 1956, I, 153.

[34] Beyond our concern here with cultures of disputation in China and Greece, such things as political fragmentation and the emergence of city-states, social upheaval and increased social mobility, and the flourishing of arts, crafts, and the technology of warfare all would likely be pertinent to a full account of this development.

Similarities in the independent reflections on spatial concepts in ancient Greece and China can, as we have seen, at least in part be explained by similarities in the elementary and instrumental knowledge reflected upon. From a Western perspective, the proximity of passages related to such diverse issues as ethics, logic, mechanics, optics, and geometry within a small text as presented by the *Mohist Canon* appears peculiar. At the same time, other fields of contemporary knowledge such as astronomy play a marginal role at best. Clearly, what knowledge is regarded relevant for a given text or textual tradition, and what knowledge is disregarded, may vary considerably among different societies and depends on the way the knowledge is shared by different societal groups.

Another difference we can observe between the Later Mohists' reflections and their Greek counterparts is that in the Chinese case there seems to be no urge to explain all of nature through certain fundamental principles, mechanisms, or elements, or to formulate encompassing natural philosophies. As concerns possible origins of this disparity between the Aristotelian and the Mohist reflections on spatial terms, the most direct cause appears to be a difference in the timing of the emergence of different types of theoretical debate. In the Greek case, the construction of cosmologies and systems of the natural world reducing all appearances to a small set of principles or elements precedes the meta-reflection about language and knowledge. The presocratics constructed competing world views of this kind long before meta-reflection arises with, or around the time of, Parmenides.[35] In the Chinese case, on the other hand, the Mohist meta-reflection precedes the establishment of comprehensive cosmologies like the Yin-Yang 陰陽 and Five-Agents (*wǔxíng* 五行) systems by several centuries. There may have been elements of these systems already present around the time of the Later Mohists, but not constituting any coherent, encompassing system. This developed only in Han times when the Mohist tradition of linguistic reflection had already lost its impetus.[36]

Finally, a notable difference that renders comparison difficult is the small size of the Chinese text corpus pertinent to theoretical reflections on space. While in Aristotle alone there are whole books devoted to the analysis and discussion of spatial concepts, in the Chinese case we mainly have the very short and very few sections that are part of the *Mohist Canon*. Furthermore, the favorable conditions for the Mohist type of reflections seem to have vanished in later times. In particular, the radical change of conditions after the foundation of the centralistic Qin empire (221 BC) appears to have cut off this tradition. Accordingly, the Mohist deliberations never entered the mainstream of the Chinese knowledge tradition

[35] Schiefsky 2012, 193–194.

[36] On the early Chinese tradition of cosmos-building, see Graham 1989, 315–370.

and for this reason lack the exegetic scrutiny and contextualization provided by later commentary.

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