

Aggregates versus Wholes: An Unresolved Debate between the Nyāya-Vaiśeṣika and Buddhist Schools in Ancient Indian Atomism

SAHOTRA SARKAR
University of Texas
November 20, 2019

Abstract

Atomism flourished amongst ancient Indian philosophical traditions including the orthodox Nyāya-Vaiśeṣika and heterodox Buddhist and Jain schools (though not all Buddhist schools accepted atomism). For the Nyāya-Vaiśeṣika and the Buddhist schools atoms were indivisible and imperceptible. But, beyond that, their accounts diverged. According to Nyāya-Vaiśeṣika atoms are eternal; for most Buddhist atomists, they are momentary. Nyāya-Vaiśeṣika and the Buddhists differed on the nature of the composites made up of the atoms. This paper reconstructs and analyzes a debate in which the Nyāya-Vaiśeṣika school held that composites are wholes that have individuality distinct from their component atoms whereas the Buddhists maintained that they were aggregates that had no distinct individuality. The paper concludes by noting how there are marked similarities between this old debate and twentieth-century debates between reductionism versus emergentism and holism.

1. Introduction.

Scientific disputes within classical Indian philosophy have received relatively little critical attention in contemporary philosophy compared to their idealistic metaphysical counterparts. This paper is intended as a modest antidote. But, before we begin, we should note that what constitutes Indian philosophy is a matter of dispute, particularly among South Asian scholars. Here, following Chatterjee (2016, p. 494), Indian philosophy will refer “to those systems of thought that were originated in India within the first 1500 years of CE and their extensions.” But, as Chatterjee also notes: “Indian philosophy is a myth created by Indologists and orientalists. Just as there was no Indian nation before 1947 [which marks independence of the subcontinent from British rule], similarly there was no monolithic body of thought called ‘Indian philosophy’ before the advent of the orientalists (p. 494).” Nevertheless, this flawed but useful history-dependent characterization will suffice for the purposes of this paper since the texts it will rely on date no later than the first few centuries CE.¹

In both research and pedagogy, the orientalists are also responsible for the focus of attention on idealistic metaphysical systems of Indian thought, especially Vedānta. Nevertheless, thanks to the efforts of scholars, starting over a century ago with Seal (1915), it is also now widely acknowledged that naturalistic and, in that limited sense, scientific accounts of the world formed a major part of the philosophical corpus of ancient India. What is far less clear is how these Indian discussions compare and relate to contemporaneous developments elsewhere or, for that matter, to modern disputes that occupy philosophers today.² This is as true of classical Indian discussions of atomism as of other scientific matters broached in that corpus.

The purpose of this paper is to analyze one scientific debate within classical Indian atomism, that between the orthodox Nyāya-Vaiśeṣika school and the heterodox Sautrāntika and Vaibhāṣika Buddhist schools, though

¹A discussion of the ideological implications of this characterization will also be left for some other occasion. It excludes, for instance, the political philosophies that emerged among Indian scholars as a result of colonial encounters. This is a large body of work that has not received critical philosophical attention (see, however, Brodov 1984) only part of which can be regarded in any plausible sense as extensions of work earlier than 1500 CE. In practice, if not in theory, it also excludes all philosophical work in India with non-indigenous (*e.g.*, Islamic) roots even if it predates 1500 CE; see, however, Ganeri (2011) which is a welcome exception, at least insofar as Islamic-Indian thought is concerned.

²For a welcome counter-example, see Kronen and Tuttle (2011) which will be used and further discussed below.

perhaps only from a Nyāya-Vaiśeṣika perspective because of the absence of the original Buddhist sources. While both sides to this debate endorsed atomism in the sense that they accepted that objects of the everyday material world consists of minute ultimate units, they differed about how these units co-occurred in the composite entities that constitute the macroscopic world.³ Nyāya-Vaiśeṣika held that composites are wholes that have an individuality distinct from their component atoms; the Buddhists held that they are aggregates that had no distinct individuality beyond the components.

Much of this debate centered around the interpretations of the emergence of composite properties that were not shared by the parts and on how the composite whole is related to its component parts. Though there is a large corpus of later commentary, the core of this debate occurred before or shortly after the beginning of the Common Era and the central text is the *Nyāya-sūtra* of Gautama which will occupy most of this paper. There was, of course, no possibility of empirical resolution of this dispute at the time (even if there had been any special veridicality attributed to empirical data by both sides—and there was not). Arguments were supposed to be decided on the basis of logic and metaphysical plausibility. Nevertheless, the debates that occurred can inform to some extent our contemporary discussions about reduction, holism, and emergence.

Section 2 that follows provides some background to classical Indian atomism. Since exegesis-for-itself is not a goal of this paper, it is short. Section 3 notes the major tenets of Nyāya-Vaiśeṣika atomism that are relevant to the debate between Nyāya-Vaiśeṣika and the Buddhists, including the role of Kanāda's *Vaiśeṣika-sūtrā*. Section 4, the core of this paper, turns to Gautama's *Nyāya-sūtra* and the commentary (*Bhāṣya*) by Vātsyāyana which provided its first (surviving) systematic exposition. These works are the only extant sources of early Buddhist atomism.⁴ Section 5 tries to draw out the modern contemporary implications of the debate.

2. Background: Atomism in Classical Indian Philosophy.

While there is no canonical chronology of periods of Indian philosophy, consistent with how “Indian philosophy” was temporally delimited in the last section, classical Indian philosophy will be construed here at beginning around 600 BCE and lasting until 1500 CE (see, however, Ganeri 2001) though nothing much will hinge on the exact dates. According to orientalist tradition, there were six orthodox or *āstika* systems (those that accepted the authority of the Vedas as eternal and infallible).⁵ Of these, the Vedānta, the Sāṃkhya, and Yoga clearly did not accept atomism in the sense of the existence of minute ultimate units of the material world; in contrast, Mīmāṃsā, Vaiśeṣika, and Nyāya clearly accept such atomism, though all such claims are subject to the usual interpretive controversies (Gangopadhyaya 1981, pp. 3 -4).⁶ Atomism was central to the doctrines of both the Vaiśeṣika and Nyāya systems (unlike Mīmāṃsā).

The Vaiśeṣika and Nyāya systems began as independent systems well before the Common Era. Of these, the former has traditionally been regarded as the older with some scholars (perhaps somewhat implausibly) dating it back to 1300 BCE (Chatterjee 2011). In the Common Era the two systems came to be treated together because of shared tenets (*samānatantra*).⁷ For instance, Chatterjee (2011, p. 112) notes six of these: a common-sense realism; a pluralist ontology; a belief that the world is created from material atoms; that these atoms were conjoined by “God”; an account of causation in which an effect is produced by a cause

³A note on the texts used in this paper: All of the most relevant sources on classical Indian atomism have been collected with commentary in a seminal work by Gangopadhyaya (1981). Except when explicitly noted otherwise, all primary sources cited in this paper are from that work. This paper mostly but not exclusively uses the translations offered there (which are mainly from standard works) but some translations have been modified for the sake of accuracy using the original Sanskrit texts which are also included in Gangopadhyaya's sourcebook.

⁴For a discussion of later Buddhist atomism, but still within the classical period as characterized here, see Carpenter and Sherice's contribution to this volume.

⁵But even the category of *āstika* system is not without controversy: Śaṅkarācārya regarded the Vaiśeṣika system as *ardhāvaināśika* or “antagonistic” to Vedic culture, as emphasized by Chatterjee (2011, p. 112). Potter (1961) attempted a radical reclassification of Indian philosophical systems but his scheme has never achieved traction.

⁶For instance, Seal (1915) interprets the Sāṃkhya to be atomists.

⁷There is a large corpus of recent philosophical work on Nyāya-Vaiśeṣika; for good accounts, see Matilal (1977), Potter (1977), and, especially, Phillips (1995), pp. 41 -74.

rather than being a manifestation of that cause; and that liberation is the cessation of suffering. Nevertheless, there were important differences. Vaiśeṣika doctrine held the world to be composed of seven categories: substance (*dravya*), quality (*guṇa*), action (*karma*), universal (*sāmānya*), ultimate differentiator (*viśeṣa*), inherence (*samavāya*), and absence (*abhāva*). In contrast, Nyāya doctrine held that there were sixteen categories: valid means of knowing (*pramāṇa*), objects of knowing (*prameya*), doubt (*saṃśaya*), aim (*prayojana*), example (*dr̥ṣṭānta*), established conclusion (*siddhānta*), constituents of arguments (*avayava*), argument (*tarka*), decision (*nirṇaya*), honest debate (*vāda*), tricky debate (*jalpa*), destructive debate (*vitaṇḍa*), fallacy (*hetvābhāsa*), underhanded trick (*chala*), false rejoinder (*jāti*), and defeat (*nigraha-sthāna*). The former accepted two modes of cognition or proof: perception (*pratyakṣa*) and inference (*anumāna*); the latter admitted four by also embracing comparison (*upamāna*) and testimony/authority (*śabda*). The syncretic Nyāya-Vaiśeṣika system emerged when the Nyāya system was enlarged to embrace the seven Vaiśeṣika categories. Cohabitation was achieved at the cost of ontological profligacy—but a critique of that and of the heterogeneity of the categories will be left for another occasion.

The source of Nyāya-Vaiśeṣika atomism was the Upaniṣadic doctrine of *pañca-manābhūtas* (or five elements): earth, water, fire, air, and *vyom/ākāśa*. These are five of the nine members of the category of substance (*dravya*), the other four being space, time, self, and mind. In Nyāya-Vaiśeṣika texts, two terms were used for atoms: *aṇu* and *paramāṇu*. The former was used in the Upaniṣads as both a noun (for any very small entity) and an adjective (meaning very small). It began to be used in the sense of atom only later, in the tradition of *sutrās* (aphorisms) commenting on the Vedas and thereby establishing the various systems of philosophy. *Paramāṇu* refers to the ultimate small entities of matter, that is, atoms in general (Gangopadhyaya 1981, p. 2). According to Nyāya-Vaiśeṣika, atoms are eternal whereas their composites (“wholes”) are not because they are ultimately destroyed, for instance, by decomposition into their components (and their subsequent recombination into new composites). There will be more on Nyāya-Vaiśeṣika atomism in the next and subsequent sections.

Besides the orthodox systems, classical Indian philosophy included three heterodox (*nāstika*) families of systems. Of these, no reliable texts survive for the Cārvāka systems and it is impossible to classify them credibly as atomist or not. The Jaina systems accepted atomism uniformly.⁸ The Buddhist systems included both those that endorsed atomism and those that were opposed to it. These systems can broadly be divided into two groups: the Hīnayāna, comprised of the Sautrāntika and Vaibhāṣika systems; and the Mahāyāna, comprised of the Mādhyamika and Yogācāra systems. The two Hīnayāna systems, which are historically earlier, are typically regarded as realist (because they endorse the reality of the external world); both endorse atomism. The Māhāyana systems reject the reality of the external world and, also, atomism with the Yogācāra system being comparatively strident in its rejection of atoms.

Though both the Sautrāntika and Vaibhāṣika systems endorse the reality of external entities (and of atoms), they differed insofar as the former held that these entities can only be inferred whereas the latter claimed that they could be directly apprehended. It is impossible to state Sautrāntika doctrine with any confidence because no seminal text has survived. In the case of the Vaibhāṣika system the situation is somewhat but not much better in our context. An important text, the *Abhidharma-kośa* of Vasubandhu has survived along with a well-known commentary by Yaśomitra.⁹ However, the *Abhidharma-kośa* is from the 5th century CE (and Yaśomitra’s commentary is from the 6th century CE), whereas the debate between the Buddhist and Nyāya-Vaiśeṣika atomic doctrines discussed below are from no later than the 2nd century CE. We will assume that some basic doctrines of the *Abhidharma-kośa* date back to this earlier period.

Given these problems with sources, the extent to which Sautrāntika and Vaibhāṣika atomism differed remains unclear. According to the latter, if we draw on the *Abhidharma-kośa*, atoms are the smallest units of the *rūpa-skandha* (collections of forms that constitute the material world). These include the five sense organs, that is, the visual, the auditory, the olfactory, the gustatory, and the cutaneous. Each of these consist of atoms with a distinctive shape: those of the visual organ have the shape of an *ajāñī* (cumin) flower; those of the auditory organ, the shape of a *bhūrja* (Himalayan birch, *Betula bhojapatra*) leaf; those of the olfactory the shape of slender iron sticks (*śalākā*); those of the gustatory organ, the shape of the half-moon; and those

⁸Mishra (2006) attempts a comparison of Nyāya-Vaiśeṣika and Jaina atomism from the perspective of what he takes to be modern science.

⁹Some independent texts, such as the *Bāhyārthasiddhi-kārikā* of Śubhagupta (8th century CE), have also survived.

of the cutaneous organ, the shape of the body itself. Atoms are thus somewhat indirectly related to sensory experience. There is a sharp contrast here with Nyāya-Vaiśeṣika thinking which treats the sensory modalities under the distinct category of quality (*guṇa*) which is not recognized by the Buddhists.

For the Buddhists, the four material elements, earth, water, fire, and air also consist of atoms or each of their types. These have both natural (*svabhāva*) and derived (*upādāya*) properties. The natural properties of earth, water, fire, and air are solidity, viscosity, heat, and motion, respectively, and thus give them distinct capacities: earth can support things, water can cause cohesion, fire causes chemical changes, and air causes displacement and growth (Gangopadhyaya 1981). The objects of the first four senses are derived properties of these elements; there are others.

More importantly, Buddhists atomists agreed that atoms were indivisible, imperceptible, and momentary, continually undergoing qualitative changes. (Some Sautrānika writers seem to have believed that they were a dynamic force or energy rather than particles of matter [Chatterjee 2017].) The *Abhidharma-kośa* states that atoms are always found in aggregates and never alone. Several lines of argument are supposed to support this conclusion including the claim that single atoms cannot produce an awareness which is what material objects must produce. The general thrust of the argument is that individual atoms have at best a fleeting existence. A considerable amount of Buddhist text is spent discussing the minimum number of atoms there must be in an aggregate that can be distinguished by the senses. While no agreement was reached, in the earlier texts there is some convergence to the view that it takes seven or eight atoms. Unfortunately, there was also very little explicit concern in the extant texts about the ontological status of these aggregates. This would be the source of perhaps the best-known dispute between the Buddhist and Nyāya-Vaiśeṣika school (as opposed to their arguably more important differences about the sensory modalities).

3. Nyāya-Vaiśeṣika Atomism.

According to Nyāya-Vaiśeṣika doctrine, earth, water, fire, and air come in two forms: eternal and non-eternal. Atoms of these four substances are eternal; their composites are non-eternal since every composite (of any kind) is eventually destroyed (by having its atoms separated). In mature Vaiśeṣika doctrine (post-500 CE), atoms, besides being eternal, are indivisible, have the smallest possible magnitude (*aṇu-parimāṇa*), and are spherical (*parimṇḍala*). (We have none of the fancy shapes of Buddhist atomism.) There is a complex hierarchical account of composite formation. First, two atoms of the same kind must form a dyad (*dyaṇuka*). This is the stage at which creation starts since atoms are eternal and cannot be created. Three dyads of the same kind combine to form a triad (*tryaṇuka*) which is the smallest perceptible entity. Finally, triads can form larger composites with each other, and in various combinations, to give rise to macroscopic objects. Nyāya-Vaiśeṣika doctrine had an array of arguments for the existence of atoms and their properties and these rules of composition but these later arguments need not detain us here.¹⁰ What matters here are arguments about atoms and the relation of composition as they were conceived from the earliest stages of Vaiśeṣika doctrine.

Compared to the Buddhist schools, textual resources related to early Nyāya-Vaiśeṣika are plentiful. The earliest basic text of Vaiśeṣika to have survived is the *Vaiśeṣika-sutrā* of Kanāda which is taken by convention to be the original Vaiśeṣika text. It cannot be dated precisely but most scholars agree that it cannot have been composed before 400 BCE and is probably no later than 200 BCE. (Nothing biographical is known about Kanāda.) The *Vaiśeṣika-sutrā* is a difficult text to explicate; there is uncertainty about the number of *sutrās* and how they should be interpreted. Almost all the early commentaries that are referred to in the subsequent literature have not survived and most interpretations have to rely on a very late (1425 CE) commentary, the *Upaskāra* of Śaṅkara Miśra. That said, the text definitely contains a developed atomic theory even if some of the arguments supporting its claims remained murky until much later when they were filled in through a vast corpus of commentary. The presence of this atomic theory in the foundational text underscores the centrality of atomism in Vaiśeṣika and, subsequently, Nyāya-Vaiśeṣika thinking. In the exposition below, attention will be restricted to those *sutrās* that are germane to the features of atoms that determine how composites are formed.

¹⁰See Gangopadhyaya (1981) and Chatterjee (2017).

In Kanāda's work, the word for atom is *aṇu* meaning very small (rather than *paramāṇu*, the more unambiguous term for atom). As noted earlier, in Vaiśeṣika doctrine, the four substances of earth, water, fire, and air exist in both eternal atomic and non-eternal composite (gross) form. For Kanāda, air in its atomic form is a substance because it has no substance to which it *inheres* (ii.1.11) and also because it has movement (*kriyā*) and qualities (*guṇa*) (ii.1.12). What is true of an atom of air is implicitly presumed to be also true of atoms of earth, water, and fire. *Inherence* is one of the Vaiśeṣika categories and one that played an increasingly central role in Nyāya-Vaiśeṣika thinking over the centuries.

Since the concept will also play an important role later in this paper it will be worth our while to explore inherence further. As Kronen and Tuttle (2011) have noted, its subtleties are such that it never received a satisfactory formal definition in the Nyāya-Vaiśeṣika corpus. Kanāda's discussion makes it clear that there is an essential asymmetry between what inheres and what it inheres in. Further, the relationship of inherence is more intimate than (mere) conjunction in which the parts retain their exact identities even after separation from each other: later Nyāya-Vaiśeṣika thinkers explicate this idea by insisting that the relationship is permanent in the sense that if it is destroyed, one of the relata must have ceased to exist. (There is a kind of parity here between the relata that stands in tension with the basic asymmetry of inherence.)

Returning to Kanāda's account, an atom is eternal because it does not inhere in a substance (ii.1.13). What Kanāda presumes here is that destruction consists of the disappearance of material parts or disintegration of their formal arrangement. Therefore, atoms, having no parts (and thus no arrangement of such parts) cannot be destroyed. Further, movement in atoms is caused by a specific invisible force (*adrṣṭa*). Unfortunately, the *Vaiśeṣika-sutrā* is silent about the nature of this force.

Atoms have qualities (iv.1.3) because, as causes, they produce qualities seen in their effects in gross matter. Atoms are not visible; consequently, visibility, and especially the perception of color, require the presence of many substances as inherent causes (iv.1.6). This can be interpreted to mean that compositeness, grossness, and color are required for visibility. Consequently there is a difference between atomic magnitudes and gross magnitudes (vii.1.10). This claim is naturally interpreted as indicating that composite units have properties that need not inhere as properties in their component parts. This interpretation, in turn, suggests that there is a sense in which composites are more than mere aggregates of their composite parts, an issue that would distinguish Nyāya-Vaiśeṣika from Buddhist atomism (see the next section).

Whether qualities of substances are eternal or not depends on whether the substances themselves are eternal or not (vii.1.3). Because atoms are eternal, qualities present in atoms of earth, water, fire, and air are also eternal (vii.1.4). The qualities residing in earth are accorded a *sūtra* by themselves (vii.1.6) because they undergo transformation by fire: they are color, taste, smell, and touch. Kanāda simply asserts that atoms are spherical (*parimaṇḍalya*) (vii.1.20), an assumption that remains unquestioned in subsequent Nyāya-Vaiśeṣika doctrine.

Later works that are a commentary on Kanāda include the *Padārtha-dharma-saṃgraha* of Praśastapāda which includes a discussion of the creation and the destruction of the physical world. The world is created from atoms and ultimately dissolves back into them. Chemical change is a result of heat changing features of individual atoms. This text is impossible to date with any certainty beyond it being earlier than 700 CE. Most commentators believe it to have been composed around 500 CE and nothing is known about the biography of Praśastapāda.¹¹ The *Padārtha-dharma-saṃgraha* is aptly regarded as the first expression of the mature form of Vaiśeṣika doctrine. (It includes the theory of composition through dyads and triads summarized at the beginning of this section.) Later Vaiśeṣika commentaries on Praśastapāda include the *Kiraṇāvali* of Udayana (which is precisely dated to 984 CE), the *Nyāyakandali* of Śrīdhara (from 980 -981 CE), and the *Setuṭīkā* of Padmanābha Mīśra (13th -14th century CE).¹²

However, from the perspective of this paper, the most important original development of Nyāya-Vaiśeṣika atomism after Kanāda is to be found in a text that is also hard to date but is believed to have been composed shortly after the *Vaiśeṣika-sutrā*, namely the *Nyāya-sūtra* of Gautama. It is certain that it is earlier than 500 CE, the time of Vātsyāyana who left an extensive *Bhāṣya* (commentary) on the *Nyāya-sūtra*. The text

¹¹See Gangopadhyaya (1981), p. 146.

¹²Details of these works and relevant excerpts from them, as well as some biographical information on the authors can be found in Gangopadhyaya (1981).

of *Nyāya-sūtra* may have evolved over centuries; Ganeri (2001, p. 10) has recently dated its redaction to the first or second century, CE.

The *Nyāya-sūtra* consists of five *adhyāyas* (parts or, roughly, books). Each *adhyāya* consists of two *āhnika*s (roughly, chapters). The basic tenets of Gautama’s atomism emerge late in the text, in the second *āhnika* of the fourth *adhyāya*. The exposition of Gautama’s views that follows will make systematic use of Vātsyāyana’s *Bhāṣya* but not of later sources that expand Nyāya-Vaiśeṣika beyond the resources available to its Buddhist opponents in the debate discussed below. Using Vātsyāyana’s elaboration of the *Nyāya-sūtra* in his *Bhāṣya* is critical from this perspective because, presumably, it addresses how contemporary Buddhists (in lost works) responded to Gautama.

In the *Nyāya-sūtra*, because atoms are eternal, and all things are composed of atoms, an absolute non-existence of all things is not possible (iv.2.17). These atoms are encountered when things are further subdivided beyond the level of the triads (iv.2.17). Recall that the triads are the smallest perceptible units. Thus, for Gautama, atoms are encountered just beyond the edge of perception. The text expends much effort to address the objection that atoms cannot be partless because must be penetrated by *akāśa*.¹³ Gautama answers this objection by characterizing internal parts of an entity as those that have a causal role in producing properties of the composite unit (iv.2.20). But, since an atom is not a produced substance (*kārya-dravya*), the term “inside” is not applicable to it. Because there are no atoms causing properties of an atom, it has no parts even if it is pervaded by *akāśa*.

Gautama’s exposition of atomism is detailed and expands significantly, though not very systematically, the fragmented remarks in Kanāda’s *Vaiśeṣika-sutrā*. It sets the stage for the subsequent systematic theory of Praśastapāda. But what is more pertinent here is how Gautama’s discussion reconstructs and responds to an ongoing dispute between Nyāya-Vaiśeṣika and the Buddhists. (Indeed, it is a major source for the views of the Buddhists given the unavailability of original material that has survived.)

4. Composites as Wholes: The Central Arguments of the *Nyāya-sūtra*.

Parts of the second and fourth *adhyāyas* of the *Nyāya-sūtra* provide a record of the Nyāya-Vaiśeṣika dispute with Buddhist atomism, beginning with disagreements about the part-whole relation. However, Gautama’s own exposition of atomism, that is, his positive theory of atoms, is only found in the fourth *adhyāya* well after the beginning of the text’s engagement with Buddhist counter-arguments. This indicates that elucidating the proper part-whole relation is more fundamental to Gautama than establishing an atomic ontology (on which there was at least superficial agreement with the Buddhists, that is, agreement about the existence of atoms though not about their properties). The structure of each of Gautama’s arguments follows what had become the standard Nyāya methodology: critical exposition begins with the statement of a doubt. In these parts of the *Nyāya-sūtra*, the doubt expressed a position held by the Sautrānika or Vaibhāṣika school of Buddhism. Typically a single *sūtra* expresses this doubt. The *sūtras* that immediately follow then address that doubt so as to refute the position it endorses.¹⁴

Recall that the Nyāya-Vaiśeṣika school views a composite as a whole whereas the Buddhists (both the Sautrānika and Vaibhāṣika schools) hold it as “merely” an aggregate of the components, that is, the atoms. The second *adhyāya* of the *Nyāya-sūtra* begins a critical examination of the concept of the whole. Gautama launches the process by examining a “doubt about the existence of the whole because it is ‘not yet proved’ (ii.1.33).” His response: “If the existence of the whole is denied, then there can be no knowledge of anything (ii.1.34).” Note that the claim is an epistemological one, and Vātsyāyana subsequently fills out the reasoning in his *Bhāṣya*: a mere assemblage of atoms cannot be seen because each atom is too small to be visible. What holds for sight presumably holds for all other modes of perception. Two separate epistemological claims are at stake here. The weaker (and uncontroversial) one is that we do have perceptions of the external world and the Buddhist position is supposed to entail that such perception would be in principle impossible: if atoms are all there is (because wholes are just assemblages of atoms), and atoms are imperceptible, the wholes would also be imperceptible. But we do have perceptions and, thus, the Buddhist argument leads to

¹³The ubiquity of *akāśa* is central to *Nyāya* doctrine; hence, the import of this objection.

¹⁴This structure is characteristic of the entire *Nyāya-sūtra*.

a contradiction. The stronger thesis concerns what must at least implicitly be assumed when we move from perception to knowledge: that perception plays a necessary role in the generation of knowledge (even if it is left open whether all knowledge ultimately arises only in perception).

What is also at stake is a rudimentary form of emergence: interactions between the parts, that is, the atoms generates properties that are perceptible and, hence, the composite is more than a mere aggregate of the parts. Recall Kanāda in the *Vaiśeṣika-sūtrā*, had argued that atoms are not visible and that the visibility and color-perceptibility of a composite (gross) unit requires the participation of multiple substances as causes. Gautama implicitly draws on this argument to refute the Buddhists who, one presumes, were responding to Kanāda. (What emergence means will be left vague here; it will be more systematically discussed in the next section.)

The next *sūtra* develops the same line of reasoning in a different way: some composite objects can be gripped (*dhāraṇa*) and pulled (*ākāṣaṇa*) whereas atoms cannot. In the *Bhāṣya*, Vātsyāyana notes that mere aggregation by itself cannot explain these properties: a handful of sand cannot be gripped or pulled because it is a mere aggregate of the constituent particles of sand. Moreover, when a composite is gripped or pulled yet another emergent feature is manifested: when an entity is pulled or gripped, that which does the pulling or gripping (say, a hand) is only in contact with some of the atoms that comprise it. Yet, the entire (whole) composite is gripped or pulled; thus, the whole must exist beyond the existence of these atoms at least in the sense of having an emergent capacity to be pulled.

Nevertheless, the argument is not entirely definitive and Vātsyāyana implicitly acknowledges this: consider a lump of sand held together with lac. It can be gripped and pulled but, even by Nyāya doctrine, it is not a whole though it has a collectivity that is different from a mere aggregation as in the case of the grains of sand (without lac). After noting this objection, Vātsyāyana lets it stand.¹⁵ This is a typical Nyāya-Vaiśeṣika move: while they provide what they took to be strong reasons to reject the Buddhist arguments, there is no point at which it is claimed that those positions have been definitively refuted. It is in this sense, as the title of this paper notes, the dispute between the Nyāya-Vaiśeṣika and the Buddhist schools remained unresolved (at least when it comes to aggregates versus wholes).

The *Nyāya-sūtra* then turns to yet another possible objection to the claim that the emergence of perceptibility is evidence of the existence of a whole: that it is possible to have perceptions of aggregates even if the parts are imperceptible (ii.1.36). Vātsyāyana elaborates: a forest is perceptible even from a distance at which individual trees are imperceptible. In the subsequent Nyāya-Vaiśeṣika corpus this argument received extensive attention over centuries. Vātsyāyana's first response was that in such situations the parts are not perceived only because of a special confounding cause, distance in the case of the forest. In contrast, atoms are intrinsically imperceptible and, thus, their aggregates should also be imperceptible. Evidence that distance acts as a confounding cause in this fashion comes from the fact that details of the individuals, for instance, the leaves of the trees are lost to the perception of the forest.

Vātsyāyana extends this argument further: if it is presumed that an aggregate of atoms is somehow more than a mere collection of the atoms, that is, it exhibits some new feature, then this argument would concede the case for the existence of wholes that are more than the sum of their parts. In his words: "Since the atoms are intrinsically imperceptible, their collectivity also must be so. If the objector argues that this collectivity of the atoms is something more than their individuality, then he will commit himself to the doctrine of the whole." There is no record of a Buddhist answer to this objection.

Moreover, Vātsyāyana goes on to argue, atoms within their composites are not properly analogous to trees in a forest to which many other different properties inhere and any argument from such a poor analogy cannot be decisive. Further, the argument simply assumes that the forest is being perceived as a whole rather than as consisting of individual trees and thus presuming what was to be proved. (Distance is the special confounding cause that leads to this false perception of *forest*.) An extensive discussion of the epistemology of the perception of a whole follows but the details are not germane here.¹⁶

¹⁵Moreover, it is left standing even though Gautama has a response available: the lac is a confounding special cause, a line of reasoning he later used to argue that forests are mistakenly perceived as wholes rather than aggregates—see, below, in the text.

¹⁶What follows in Vātsyāyana's *Bhāṣya* includes a long (and interesting) digression on the properties of sound as a whole. It

A new set of Buddhist objections to the reality of the whole are addressed in the fourth *adhyāya*. The first of these is that there is no logical basis to any claim that a part occupies a whole or any segment (*ekadeśa*) of the whole (iv.2.7). That it cannot occupy the whole in its entirety follows from the difference in the magnitudes of the two: a part must be smaller than the whole. That leaves open the possibility that the part occupies a segment of the whole. The trouble is that the whole *qua* whole has no segments to be occupied. (Indeed, according to Vātsyāyana, the only segments of a whole are the parts themselves. Thus there can be no question of occupation.)

This still leaves open a third possibility, that the whole occupies the part. (After all, anyone positing ontological primacy to the whole may well choose to demote the parts to such a subsidiary status.) The next *sūtras* of the *Nyāya-sūtra* duly notes the objections, first, that: “the ‘whole’ does not exist, because the ‘whole’ cannot be present within the parts” (iv.2.8); second, in the *sūtra* that follows, that the whole “is present neither within something other than the parts” (iv.2.9).

Gautama finally proceeds to answer these objection with a dose of hair-splitting metaphysics relying on linguistic usage: “The question [of parts occupying a whole] does not arise, because there being no difference within a single entity, the use of ‘words signifying difference’ (*bheda-śabda*) is not [logically] justified” (iv.2.11). In the *Bhāṣya*, Vātsyāyana points out that the word for “entire,” *kṛtsna*, and the word for “segment,” *ekadeśa*, both assume differences which are logically inadmissible in this context because they presume a part-aggregate distinction. They cannot be used with respect to a whole. By itself, this argument would not generate much confidence in the Nyāya-Vaiśeṣika position. Luckily Gautama does not stop here and attempts to elaborate an alternative positive account of the part-whole relation.

Gautama’s intended conclusion to be drawn from the dispute with the Buddhists seems to be that the whole is connected to its parts through the relation of inherence mentioned earlier in this paper and that this relation must not be explicated using relations such as that of being an entirety or a segment. The whole and the parts cannot exist independent of each other. There is no other part to a whole other than its component parts (iv.2.12). Though this is far from clear from the text, commentators (including Vātsyāyana) now interpret Gautama, following Kaṇāda, to hold that the whole must be contained in the parts, that is, the whole is the superstratum (*āśrita*) with the parts as the substratum (*āśraya*).

From a textual perspective, a word of caution is in order here. It is natural to interpret the superstratum-substratum relationship invoked by Vātsyāyana to be that of inherence and most modern commentators make this move. That move is supported by the fact that the concept of inherence goes back to Kaṇāda. Nyāya commentators began invoking inherence explicitly to interpret Vātsyāyana’s intent at least as early as the 6th century CE (probably starting with Uddyotakara). The argument is straightforward: there is obviously some relation between whole and part. This relation cannot be that of conjunction because it is required that the whole would not longer be a whole, and a part would no longer be a part, if the part-whole relation ceases to exist. Thus the whole must inhere in the parts. Nevertheless Gautama does not use the word for inherence (*samavāya*) in this context even though he uses it in the third *adhyāya* of the *Nyāya-sūtra*. Similarly, Vātsyāyana also does not use the word in this context in his *Bhāṣya*.

Nevertheless, there should also be some caution about reading too much into the non-use of a word that only later became part of the received technical vocabulary of the Nyāya-Vaiśeṣika school. Given Kaṇāda’s use of the concept of inherence in the *Vaiśeṣika-sutrā*, and that it seems to be a straightforward interpretation of what Vātsyāyana was invoking in the superstratum-substratum relation when commenting on Gautama, the next section will use inherence as part of an assessment of the contemporary relevance of the dispute between Nyāya-Vaiśeṣika and the Buddhists.

5. Reflections.

Kronen and Tuttle (2011) have recently defended a modified version of the Nyāya-Vaiśeṣika theory of parts and wholes based on the relation of inherence though the version of the theory they use is of much later vintage than the one being considered here. (According to them, the Nyāya-Vaiśeṣika account of

is beyond the scope of this paper.

substance is superior to the Aristotelian account. Establishing this claim is the main purpose of their paper but this is an issue that is beyond the scope of this paper.) In the process of formulating their defense, Kronen and Tuttle correctly note the relevance of the Nyāya-Vaiśeṣika account to contemporary discussions of reductionism.¹⁷ However, that discussion is short on detail with respect to reductionism which they identify with the Buddhist view of wholes being assemblages of parts and then reject on the metaphysical ground of a difference in identity of a whole and a set of the parts.

From their perspective, Nyāya-Vaiśeṣika theory provides an account of “structural” explanation of wholes that is superior to Buddhist reductionism. What they mean by “structural” remains unclear though their remarks imply that a mere set does not have structure in the intended sense. This can be interpreted to mean that a whole must be a class with some additional internal relations between their members beyond being elements of the class *qua* set. If the Buddhist conception of aggregate refers only to a set, then the Buddhists are denying any additional internal structure. Whether such an explication constitutes a coherent interpretation of the texts remains questionable since the texts make no mention of internal relations. In general, a much more nuanced treatment is necessary to assess if the Nyāya-Vaiśeṣika account has any positive contribution to make to discussions of reductionism and its alternatives. Let us turn to such an assessment.

By reductionism, here, we will mean the view that all features of a whole (which will be construed spatially¹⁸) can be accounted for in terms only of features of its parts.¹⁹ Reductionism, so construed, has a long history in the Western philosophical tradition, going back to the mechanical philosophy of the seventeenth century. In explicating “accounting for” we must distinguish between epistemological and ontological interpretations. By and large, twentieth-century philosophy of science interpreted “accounting for” epistemologically: reduction was construed as a type of explanation in which features of the whole were explained entirely by features of the parts.²⁰ In contrast, the standard construal of “accounting for” in metaphysics is ontological: reduction is a claim of exclusive upward causation (or determination) from the constituent parts to the whole.

Of course, the two interpretations are not disjoint. For instance, it is often assumed that explanation may consist of an identification of causes. If this view of explanation is adopted, the epistemological and ontological interpretations of reductionism are intimately intertwined. The intent of the Nyāya-Vaiśeṣika account of the part-whole relation is clearly causal and what follows will follow that interpretation. However, we will assume that there is a sufficiently close connection between causes and explanation so that contemporary epistemological discussions of reductionism from the philosophy of science can credibly be given an ontological gloss based on the Nyāya-Vaiśeṣika part-whole theory without misinterpretation.

Because of the continuity between the mechanical philosophy and modern science, the success of science has often been regarded as a triumph of reductionism. But there always have been skeptics.²¹ During the twentieth century three skeptical movements have challenged reductionism, in particular, whether it was ever useful in science and, even if it had once been useful, whether it has outlived its utility and is no longer the best methodology for further scientific progress. The best-known of these skeptical movements is *organicism*²² which has largely been confined to discussions of biological phenomena. Organicism posits that the role of parts in a whole cannot be properly understood without understanding the functioning of the whole. Even though the Nyāya-Vaiśeṣika account of the material world does have a normative content, and thus permits discussions of functions and teleology, these considerations played no role in its account of the part-whole relation and in the debates with the Buddhists. In what follows, we will ignore organicism

¹⁷They call it “reductivism” but that is merely a terminological difference.

¹⁸This means that the whole exists as an entity in space, however that is explicated. It thus already has features beyond being merely a set of its parts. For a discussion of categories of reductionism that do not embrace spatiality, see Sarkar (1998).

¹⁹For more details on this view of reductionism and its history, see Sarkar (2008) and the references therein. Sarkar et al. (2017) provide an annotated bibliography.

²⁰The *locus classicus* of this view is Nagel (1961); for an analysis, see Sarkar (2015).

²¹There have always been good grounds for this skepticism. As was recognized in the West by the end of the seventeenth century, the mechanical philosophy denied action-at-a-distance whereas the most predictively precise and accurate theory that had ever been formulated was Newton’s theory of gravitation which embraced action-at-a-distance. There were many attempts to provide a mechanical basis for Newtonian gravitation in subsequent centuries and they failed comprehensively until the project seems to have been abandoned in the nineteenth century.

²²See Beckner (1974) and Gilbert and Sarkar (2000).

on the ground that it is not relevant to our concerns.

The other two skeptical movements, emergentism and holism, remain relevant to our context. *Emergentism* embraces the doctrine that wholes have features that their parts do not.²³ This ontological claim is supposed to entail an epistemological thesis that even a complete knowledge of all features of the parts will not allow explanation, let alone, prediction of all features of the whole. The relevant features of the whole are “emergent” in this way (and emergentism is sometimes called the doctrine of emergence). In Nyāya-Vaiśeṣika doctrine, the ontological thesis dates back to the discussion of perceptibility in Kanāda’s *Vaiśeṣika-sutrā*. It is the reason why wholes are supposed to exist beyond the aggregate parts.

Holism is a more murky thesis, officially dating back only to the 1920s when the term was introduced.²⁴ According to holism, the parts of a system (as characterized within the system) do not exist independent of the whole and, thus, in this sense, wholes are more than an aggregate or the “sum” of their parts. The quantum world provides an uncontroversial example: holism is characteristic of what are called *nonseparable* systems.²⁵ These are systems with multiple interacting parts where some features of each part can only be characterized by also referring to other parts. The parts thus lose their individual identity. In that sense properties of parts depend on those of the whole.

To go into more detail: in quantum mechanics, each entity is represented by a state vector belonging to a mathematical structure called the Hilbert space for that entity.²⁶ If two entities interact, they are represented as a state vector in a more complicated mathematical structure consisting of a tensor product of the Hilbert spaces of each of the entities. Since the two interacting entities then become inseparable, this state vector may be in an *entangled* state, that is, it is not a tensor product of component state vectors with each such component belonging to exactly one of the Hilbert spaces of the constituent entities.²⁷ Thus, in an entangled state, we cannot refer to either of the entities without invoking the other. In this sense, neither entity can exist as it does without the presence of the whole.

Both emergence and holism are relevant to the Nyāya-Vaiśeṣika account of the part-whole relation; what makes it interesting to recast that account using these contemporary resources is the role played by the relational category of inherence. From the Nyāya-Vaiśeṣika perspective emergence allows the whole to exist beyond being a mere aggregate of its parts as the Buddhists maintained. Now, as the case of the forest and the trees shows, besides genuine emergence there are misleading cases of apparent inherence. These are detected by showing confounding external causes misleading the senses. In the case of genuine emergence, the parts have a much more intimate relationship with each other (beyond conjunction or aggregation). Thus, in holistic systems, the parts exist as such because of some feature of the whole. Inherence captures that feature: the whole inheres in its parts. But inherence does even more: it underscores holism by the requirement that, if the relation of inherence ceases to hold, either the whole or the part (or, of course, both) ceases to exist.

Now, recall that inherence is an asymmetric relation. Thus, there is a sense in which parts are privileged over the whole.²⁸ Thus, this account captures the intuition of the reductionists that there is a sense in which parts are more important than the whole. But the most important role inherence plays in this story is that, by insisting that we look beyond mere aggregation of parts, it forces a focus on structure or arrangement: second-order features of the parts that, so to say, construct the whole *qua* whole.²⁹ This is what the Buddhist doctrine of mere aggregation misses. It is also what any plausible twentieth-century reductionist account

²³A good discussion, though limited to physics, is in Butterfield (2011). Nagel’s (1961) earlier analysis continues to be relevant.

²⁴The term goes back to Smuts (1926).

²⁵There is a vast literature on this topic. Shimony (1987) and Jaeger and Sarkar (2003) provide useful entries into the literature.

²⁶Technically, the entity is represented by a *ray* of vectors rather than a single vector but that complication does not affect our argument.

²⁷Once entities become inseparable in this way, standard quantum dynamics does not allow them to evolve into separable ones represented by a tensor product of individual state vectors. One example of this problem is quantum measurement where one entity is the measuring apparatus and the other they system being measured. The well-known quantum measurement problem is just a special case of the more general disentanglement problem.

²⁸In twentieth-century work, a similar role can be attributed to supervenience. But that is a type of discussion that does not form part of the Nyāya-Vaiśeṣika account of the part-whole relationship that is being discussed here.

²⁹This seems to be what Kronen and Tuttle (2011) recognized.

must also have accepted.³⁰ It remains part of our discussions of reductionism today. In this way, the Nyāya-Vaiśeṣika framework facilitates an interesting reconstruction of contemporary discussions of reductionism, holism, and emergence.

References

- Beckner, M. 1974. Reduction, hierarchies and organicism. In Ayala, F. J. and Dobzhansky, T. Eds. *Studies in the Philosophy of Biology: Reduction and Related Problems*. Berkeley, CA: University of California Press, pp. 163 -177.
- Brodov, V. V. 1984. *Indian Philosophy in Modern Times*. Moscow: Progress Publishers.
- Butterfield, J., 2011. Emergence, reduction and supervenience: A varied landscape. *Foundations of Physics* 41: 920 -959.
- Chatterjee, A. 2011. Nyāya-Vaiśeṣika philosophy. In Edelglass, W. and Garfield, J. L. Eds. *Oxford Handbook of World Philosophy*. Oxford, UK: Oxford University Press, pp. 112 -126.
- Chatterjee, A. 2016. Naturalism in Indian philosophy. In Clark, K. J. Ed. *Blackwell Companion to Naturalism*. Malden, MA: Blackwell.
- Chatterjee, A. 2017. Naturalism in classical Indian philosophy. *Stanford Encyclopedia of Philosophy* (Winter 2017 Edition). <https://plato.stanford.edu/archives/win2017/entries/naturalism-india/>.
- Ganeri, J. 2001. *Philosophy in Classical India*. New York: Routledge.
- Ganeri, J. 2011. *Lost Age of Reason*. Oxford, UK: Oxford University Press.
- Gangopadhyaya, M. 1981. *Indian Atomism: History and Sources*. Atlantic Highlands, NJ: Humanities Press.
- Gilbert, S. and Sarkar, S. 2000. Embracing complexity: organicism for the 21st century. *Developmental Dynamics* 219: 1 -9.
- Jaeger, G. and Sarkar, S. 2003. Coherence, entanglement, and reductionist explanation in quantum physics.” In Ashtekar, A., Cohen, R. S., Howard, D., Renn, J., Sarkar, S., and Shimony, A. Eds. *Revisiting the Foundations of Relativistic Physics: Festschrift in Honor of John Stachel*. Dordrecht: Kluwer, pp. 523 -542.
- Kronen, J. and Tuttle, J. 2011. Composite substances as true wholes: Toward a modified Nyāya-Vaiśeṣika theory of composite substances. *Canadian Journal of Philosophy* 41: 289 -316.
- Matilal, B. K. 1977. *Nyāya-Vaiśeṣika*. Wiesbaden: Otto Harrassowitz.
- Mishra, A. K. 2006. Atomism of Nyāya-Vaiśeṣika *vs* Jainism—A scientific reappraisal. *Indian Journal of History of Science* 41: 247 -261.
- Nagel, E. 1961. *Structure of Science: Problems in the Logic of Scientific Explanation*. New York: Harcourt, Brace, & World.
- Phillips, S. 1985. *Classical Indian Metaphysics*. Chicago: Open Court.
- Potter, K. H. 1961 A fresh classification of India’s philosophical systems. *Journal of Asian Studies* 21: 25 -32.
- Potter, K. H. 1977. *Tradition of Nyāya-Vaiśeṣika up to Gaṅgeśa*. Delhi: Motilal Banarasidas.
- Sarkar, S. 1998. *Genetics and Reductionism*. New York: Cambridge University Press.
- Sarkar, S. 2008. Reduction. In Psillos, S. and Curd, M. Eds. *Routledge Companion to the Philosophy of Science*. London: Routledge, pp. 425 -434.
- Sarkar, S. 2015. Nagel on reduction. *Studies in History and Philosophy of Science Part A* 53: 43 -56.
- Sarkar, S., Love, A., and Wimsatt, W. C. 2017. Reductionism in biology. In Pritchard, D. Ed. *Oxford Bibliographies in Philosophy*. New York: Oxford University Press, <http://www.oxfordbibliographies.com/view/document/obo-9780195396577/obo-9780195396577-0359.xml>.
- Seal, B. 1915. *Positive Sciences of the Ancient Hindus*. London: Longmans, Green & Co.

³⁰And, indeed, they typically do—see, for instance, Sarkar (1998).

Smuts, J. C. 1926. Holism and Evolution. London: Macmillan.