Introduction

Our world is filled with chaos and diversity. Arranging things into order is an important means for human beings to understand the world and their own positions within it. This process is known as 'classification'. We see classification everywhere in our life – from grocery store shelves to cyberspace.

In archaeology, typology is a common form of classification, serving as an important method to describe and explain the diversity of archaeological assemblages. While typologies are continuously questioned, given their artificial separation of material culture based on specific aims (Hill & Evans 1972; Hayden 1984), little debate, surprisingly, has centred around the classification of animal remains. Zooarchaeologists assume that Linnaean taxonomy is scientific, systematic and unambiguous (Driver 2011). The International Code of Zoological Nomenclature (ICZN) has established a universal language to standardise faunal data, which is hence compatible for cross-cultural comparisons. Such use of standardised taxonomy in archaeology, however, obscures areas of the past world where totally different classificatory systems might have been employed. Modern zoology was established in the context of the modern synthesis of biology, whose current form developed in the early twentieth century reconciling Darwinian evolution theory and Mendelian genetics. While taxonomy in faunal reports informs us on animal 'species', ancient people unlikely came across the concept of 'species' that we think of today. What they encountered were entities formulated within their own taxonomies. When we use terms such as '*Sus scrofa*' to discuss pigs in prehistory, do we in fact project our own ideas onto the ancient mind? This question is the starting point that motivates this study on late Neolithic and early Bronze Age animal categories in Central China.

1.1 Taxonomy in zooarchaeology: a reconsideration

There are two major reasons behind my research interest in prehistoric folk taxonomies.

Before this study, my major focus was on the role played by wild animals in farming societies. Despite continued exploitation of wild animal resources after the occurrence of domestication (Kent 1989; Zvelebil 1992; Hamilakis 2003), there is a surprising lack of literature addressing the issue. It would seem that such a general neglect of wild animals in the archaeological study of farming societies, especially during the Neolithic and after, has resulted from an evolutionist emphasis on domestication and a modern value judgment biased towards agricultural lifeways (Zvelebil 1992). As I unpacked this topic it became clear that the

binary division of animal categories was indeed a Western ideological construct. The topic underlining wild animals and farming societies itself also fell into this evolutionist form of thinking. Therefore, before addressing the problem of wild animals, it becomes necessary to re-examine the wild/domestic division in farming societies, paying attention particular to how these animal categories were understood by these past societies, and how their divisions, if any, may have differed from our own modern constructions.

The second reason for this research centres on methodology. Faunal remains from archaeological sites are usually classified according to the Linnaean system (*e.g.* Schmid 1992: 52; O'Connor 2000: 39-40; Reitz & Wing 2008: 33-6), but the categories within this paradigm do not necessarily mirror those in the past. The role of this taxonomic approach in zooarchaeology is therefore worth reconsidering. Even nowadays, non-Linnaean folk taxonomies can be found existing simultaneous to the Linnaean system – restaurant menus, animal folk names, grouping of herds among stock farmers, to name just a few. Likewise people in the past might have categorised animals in different ways that are not reflected through the Linnaean taxonomy which, although useful, is not all-encompassing. Therefore, an alternative and complementary method has to be formulated to approach the animal taxonomies of the past. It is precisely this methodological attempt that lies at the core of this study. This methodology aims to examine an archaeological pathway towards understanding folk taxonomy.

These two concerns together lead me to the archaeological exploration of folk animal taxonomies in the past.

1.2 Anthropological approaches to taxonomy

Though Linnaean taxonomy is widely employed nowadays, several alternative classificatory systems are used in certain circumstances. While the Linnaean system is described as scientific, these alternatives are on the other hand described as 'folk taxonomies'. The study of folk taxonomy first gained academic interest among anthropologists in the 1950s during the early days of the New Archaeology movement in North America. Two mainstreams in taxonomic research – the formalist and cultural relativist approaches, gradually began to take shape – from within this movement.

1.2.1 Formalism: general principles

Conklin's study (1954) on the ethnobotany of Hanunoo culture in the Philippines initiated formalist ethnobiology.

Conklin's work recorded Hanunoo native taxa in great details and also explored their taxonomic system and economic utility.

The pioneering works in ethnobiology conducted by Berlin and colleagues (1966) have exerted a continuous and profound influence upon anthropological studies of folk taxonomy. The approach, grounded in rigorous linguistic principles, later became known as 'the school of formalists'. Formalists are convinced that the only hard fact resides in the words used to describe categories (Ellen 2006: 41) — in other words, nomenclature. A fixed name for a particular category is the outcome of the perceptual process in which the categorical conception is registered and reinforced through repeated practice and transmission among all members within a society over a considerable duration (Conklin 1962; Ellen 2006). Nomenclature is formal knowledge: a type of knowledge encoded in language, according to Ellen's definition (1999). Every single categorical group is named in the Linnaean system. It is hence appropriate to view Linnaean taxonomy as formal knowledge.

Given the importance of nomenclature, Berlin and his colleagues conducted their research primarily on the basis of categorical names in native languages collected from non-Western societies, analysing semantic meanings and hierarchical organisations in order to achieve structural regularities among ethnobiological classifications the world over (Berlin *et al.* 1973).

Berlin and colleagues summarised four general principles which are claimed to be cross-culturally applicable (Berlin *et al.* 1973). To wit: (*ibid.*):

1. Organisms are grouped according to various degrees of inclusiveness and each class (taxa, as Berlin refers to it) is assigned linguistically recognisable name.
2. Ethnobiological categories, referring to the classes which include taxa, are defined by both linguistic and taxonomic criteria. In general, they are hierarchically: 'unique beginner', 'life form', 'generic', 'specific' and 'varietal', according to Berlin's terminology. Occasionally, a sixth 'intermediate' category is found.
3. Ethnobiological categories are organised in a hierarchical system where taxa in each rank are mutually exclusive.
4. As taxonomic structure is hierarchical, taxa belonging to the same category are also placed at the same taxonomic level.

Berlin and his colleagues (1973) also drew conclusions regarding certain general tendencies shared by multiple folk taxonomies:

1. Taxa belonging to the category of 'unique beginner' are usually not labeled linguistically. This category roughly correlates to 'kingdom' category in Linnaean taxonomy in which plants and animals are not always named.
2. The ethnobiological category 'life form' which immediately includes generic taxa normally contains five to ten members. They are polytypic and labeled by primary lexemes (*e.g.* the native language counterpart of 'bird', 'fish' and 'mammal').
3. Taxa belonging to the 'generic' category are large in number, up to 500 classes.
4. Taxa in the 'specific' and 'varietal' categories are fewer than those of the 'generic' category. They are identified by only a limited number of features, if not by only one. Their names are composed of secondary lexemes.
5. An intermediate taxon is immediately included in one of the major life form taxa and includes generic taxa. These classes are also recognised as 'covert categories' since they rarely feature labeled names.

Apart from the above principles on the level of ethno-taxonomy as a whole, Berlin and his colleagues stated four principles relating to nomenclature (Berlin *et al.* 1973):

1. Generic taxa are labeled by primary lexemes. They are either terminal or immediately include taxa labeled by secondary lexemes.
2. Life-form taxa are labeled by primary lexemes. They are not terminal and immediately include taxa labeled by primary lexemes.
3. Specific names are labeled by secondary lexemes. They are terminal and are immediately included in taxa labeled by primary lexemes.
4. Varietal names are labeled by secondary lexemes. They are terminal and are immediately included in taxa labeled by secondary lexemes as well.

Berlin and his colleagues then proceeded on to demonstrate the applicability of the above nomenclatural principles in a variety of languages (*e.g.* Cantonese in China, Guarani in South America). The widespread validy of these claims persuades formalists to believe in the universal nature of taxonomies among various cultures.

In an earlier work, Berlin and colleagues (1966) also speculated on the existence of two types of taxonomic systems: the general-purpose classification where multiple organism attributes are considered and phylogenetic and genetic relations manifested, and the specific-purposed classification based on a limited set of attributes serving a a particular purpose. 'Scientific taxonomy' (*i.e.* Linnaean taxonomy) is, for example, a general-purpose system, and as such is treated as 'natural' – while a special-purpose system is perceived to be 'artificial' as it leans toward particular features of interest (*ibid.*). Paradoxically, Ellen (2008) demonstrates the inverted usage of these two terms. Scientific classification is developed by groups of specialists in the pursuit of specific knowledge while ethno-taxonomies are products of common people who establish and use them in daily life, hence being of 'general cognitive and social utility' (*ibid.*). This paradox challenges the formalist use of Linnaean taxonomy as absolute truth in comparison with ethno-taxonomies, reminding us of the particular social and historic background to the Linnaean as any other taxonomic system.

In the field of ancient Chinese ethno-taxonomic research, a highly formalist approach, modified by historiographical

tradition, was adopted by Guo and her colleagues (1999) in the compiled volume 中國古代動物學史 *Zhongguo Gudai Dongwuxue Shi* (*The History of Zoology in Ancient China*). Dwelling upon textual records from ancient China, nomenclature is their main source of study. In the main body of this work, Guo and her colleagues strive to match each animal category appearing in ancient writings with specific Linnaean taxonomic group(s). Consequently, such assignments, which though possibly suggestive of the degree of correspondence between the two taxonomies, failed to justify animal categories in their own context.

In short, this body of work, rigidly peformed within its linguistic paradigm, has reached some convincing conclusions, such as the universality of a concept of basic category, and pointed to cross-cultural similarities in the ways people organise their natural world. The formalist usage of native language serves an analytical device to approach ethnobiological knowledge, ananalysis of nomenclature that is basically conducted from an etic perspective. Within this framework, borders between different cultural and ecological contexts tend to be dismissed, and specific cultural configurations in varying societies are marginalised (Atran 1990). It is precisely such a weak engagement of cultural-specific variations that has resulted in this approach being contested by non-formalist anthropologists.

1.2.2 Cultural relativism: contextual variables

Resistance to the formalist school grew in the late 1970s. Scholarly opinion on folk taxonomy varied, but in general the ubiquity of social- and cultural- specific settings contributing to classification (Ellen 2006: 41; Hunn 2007) was underscored. Social constructivists such as Durkheim and Mauss, and the symbolic anthropologist Lévi-Strauss, to a certain degree, all influenced the formulation of this approach (Ellen 2006).

The work of Berlin and his associates was faulted due to its general neglect of the cultural-specific factors involved in taxonomic formation. A plethora of examples come readily to hand. The Mbalame-speaking people in Africa, for example, do not perceive the chicken as a 'bird', but instead place it under the '*chiweto*' category of domesticated animals (Morris 2000). Ellen's (2006) work on the Nuaulu folk taxonomy in Indonesia also provides an example from the cassowaries. The cassowary (*Casuarius casuarius*) is a large flightless bird. In Nuaulu taxonomy, the cassowary is placed in the same category '*manue*' as birds and bats on account of all being winged creatures, while, at the same time, also categorised under '*peni*' together with pigs and deer, considered as ritual games (Ellen 2006). Therefore, culture-specific factors are too prevalent to be treated as trivial when studying animal classifications. This sociologically framed school is known by the name of 'cultural relativism', in contrast to the 'universalism' advocated by formalists.

Studies of animal classification in ancient China do not follow either of these approaches to the full. Although studies like Guo *et al.* (1999) rely on linguistic evidence, the analysis largely follow a historiographical approach. For certain studies, the core of the research roughly correlates with formalist or relativist ideas. As noted earlier, 中國古代動物學史 *Zhongguo Gudai Dongwuxue Shi* (*The History of Zoology in Ancient China*) shares simiarities with the formalist movement in its approach to ancient categories. Sterckx's *The Animal and Daemon in Early China* (2002) examines the problem from a more-or-less relativist perspective, discussing taxonomies with frequent references to their particular social background. Sterckx (2002) considers animal classification within a broad cosmos articulating different social domains, precisely underpinning the relationship between animal categories and the categories of other objects including time, space, the weather, social class and so forth (*ibid.*). In this way, animal classifications in ancient China longer belonged to some odd and remote museum collections isolated from their natural and social background but are fully comprehended within the context of ancient China where the understanding of the universe as a whole hung over the empirical knowledge of the realistic world.

In addition, cultural relativists consider taxonomy beyond nomenclature. Ellen (1999) identifies two types of knowledge responsible for the formation of animal categories. The first, formal knowledge, has been discussed in association with nomenclature above,. The second, substantive knowledge, is defined as knowledge 'which people actually apply when engaged in the regulation and extraction of resources, activities that ultimately enhance their adaptiveness' (*ibid.*). The theory of substantive knowledge ably explains the presence of the particular categorical group called 'covert category'. A covert category is a category which is not linguistically labeled (Berlin 1972; 1973; 1974; 1976). It usually occurs at unique beginner or intermediate level and can be evidently recognised by anthropologists through slip-sorting performed by informants (Berlin *et al.* 1968: 293). The slip-sorting is performed in this way: Berlin and his colleagues find that 'plant' forms an unnamed conceptual category in the Tzeltal taxonomy used among indigenous groups of southeastern Mexico. When Tzeltal informants were asked to group slips inscribed with plant and animal names based on their similarities, they could always divide animal names and plant names into two groups, indicating the existence of unnamed categorical groups correlating to 'plant' and 'animal' respectively (*ibid.*). Nomenclature therefore fails to embrace all categories. Behavioural practices, in addition, may help elucidate the entire picture of a taxonomic system. The consideration of covert categories associated with substantive knowledge again empowers relativist negotiation about contexts beyond language.

The relativistic paradigm offers no absolute truth about animal classification to which other taxonomies can universally refer. Each taxonomy (including Linnaean taxonomy) is viewed as a special cultural institution deeply embedded in particular environmental and social

configuration, Linnaean taxonomy not excepted. In essence Linnaean taxonomy, as any other folk taxonomy, is likewise the outcome of a particular social and historic context. The wide employment today of Linnaean taxonomy but not Chinese or Mayan taxonomies instead, as the standard tool for identifying organisms is simply the result of the course of global history: European voyages to the rest of the world, the taxonomic interest in newly-discovered animals and plants, the scientific enlightenment of the eighteenth century, and the economic, military and ideological expansion of the West (Stearn 1973: 6–50). From this relativist point of view, Linnaean taxonomy and other folk taxonomies are self-evidently on an equal footing. Therefore, the focal point in the comprehension of a particular taxonomy lies in exploring its link with the social and historical background where it is established and utilised.

1.2.3 Tackling the tension

When different taxonomies are placed on an equal footing, each presents a method to describe the order of the world imposed by particular social and historic regulations and restrictions. We should not be surprised to find tremendous departures between taxonomies. Meanwhile similarities are shared by various classificatory schemes, as exemplified by the correspondence between Linnaean taxonomy and the Tzeltal taxonomy in Mexico suggested by Berlin and his colleagues (1966).

To explain such correspondence, Atran (1990) describes the role played by common sense in the process of classifying. Indeed Atran's theoretical evaluation of taxonomic derivations and similarities, attempts to bridge the theoretical gap between formalists and cultural relativists (Wapnish 1995).

Atran (1990: 263–4) acknowledges that the existence of a universal cognitive disposition 'determines a core of spontaneous formulated representations about the world'. Basic representations of the world are remarkably similar between cultures, it is no wonder that resemblances can also be found among taxonomies of different times and spaces, particularly in the core constituents. These universal cognitive characters therefore explain the cross-cultural similarity found among different taxonomies. In Atran's terminology, the universal cognitive disposition is exactly the 'common sense' shared by almost every human being (see Atran 1990). It is to be noted that, rather than the narrow definition specifically denoting knowledge content shared by members of a particular culture, Atran's common sense refers to the natural, basic ability of each human mind to apprehend the world and correspondingly act based on its cognitive process. Common sense processes information from the world spontaneously (*ibid.*: 264). For example, newly acquired understandings about objects themselves are conceptualised directly by common sense, including knowledge about the animals themselves. Atran (1990: 264) further suggests that a step of sophisticated conceptualisation follows the spontaneous common-sense apprehension of living things in order to elaborate

information that is only partly understood, aiming at an ameliorated understanding through this process. Thoughts acquired through sophisticated conceptualisation are mainly about knowledge itself, such as ideas and notions in biology (*ibid.*). This sophisticated conceptualisation process is the starting point where diversities among taxonomies first occur.

After proposing embracing the role of common sense into the apprehension of folk taxonomy and modern biology, Atran, along with many other researchers, such as Douglas and Medin (see Medin & Atran 1999) made considerable effort to combine anthropology and psychology, aiming towards an interdisciplinary research agenda.

1.3 Previous studies on folk taxonomy: from anthropology to archaeology

While anthropological interest in folk taxonomy has increased, archaeologists have paid less attention to the subject. The result has been that only a handful of archaeological researches are devoted to the study of the folk taxonomies of the past, surely constraining our knowledge on historic and prehistoric human-and-animal relationships .

Summaries serving as general appraisals and outlooks for future archaeological work in folk taxonomy can be found in O'Connor (2013) and Sykes (2014). Both raise the issue from a larger research background and outline a series of blind points in current studies of folk taxonomies. Sykes (2014) in particular correctly points out how reliance on Linnaean taxonomy in zooarchaeology has caused us to project our own ideology onto past societies, and she urges zooarchaeologist to consider folk taxonomies when dealing with different social and cultural systems. Sykes' work also offers insightful discussions on themes of domestication, human's relationships with wild animals and ritual use of animals, calling on zooarchaeologists to reflect on larger archaeological questions.

Pioneering work integrating ethno-science, archaeology and history was conducted by Wapnish (1995), identifying folk categories in ancient Ugaritic and Akkadian texts. She argues that a concept of covert mid-level category in folk taxonomy (albeit one absent in Linnaean taxonomy) helps clarify the history of translation between the Ugaritic word *anhr* and Akkadian *nahiru*: these two words not only define one specific animal but also encapsulate the concept denoting 'part of ' or 'kind of' notions in folk categories (*ibid.*). Wapnish's research is heavily influenced by the formalist school. As a result, though she includes a section discussing faunal remains from archaeological sites, most of her arguments are essentially linguistic.

Other studies take a more or less cultural relativist attitude in tackling the issue. These arguments are firmly installed in archaeological evidence and their conclusions strongly support variation in animal taxonomy due to specific natural and cultural variations. Serjeantson's exploration of

animal categories at medieval Winchester is one example. She reveals a division between food and non-food animals and within edible categories a separation between wild and domestic animals (Serjeantson 2000).

Even fewer studies touch on prehistoric taxonomy. In Marciniak's (2011) research in the Neolithic Polish lowlands, he analyses the taphonomy of faunal bones and discovers that the breaking pattern of cattle bones indicates a special manner of marrow consumption that includes roasting, breaking and cooking, while by contrast sheep/goat marrow were not roasted. He also analyses the body part representation in different animals, the result of which implies that cattle and pig were selected for certain anatomical elements whereas sheep/goat bones composed highly processed elements. The spatial pattern of bones, showing cattle and pigs were deposited in public spaces between long houses and sheep/goat bones in or around the house, again implicates two types of consumption. Linking the evidence above to ethno-taxonomy, Marciniak argues that different treatment of cattle and sheep/goat bones might correlate to a differentiation between categories of 'animals-already-domesticated' from 'animals-recently-domesticated'.

Previous studies show us the possibility to interpret faunal remains from two directions. The formalist approach pinpointing the general characteristics of the folk taxonomy is helpful in setting up a research focus and framing a theoretical structure for research, whereas archaeological data can be fully explored under the relativist approach. Therefore my interpretation of faunal remains to address folk animal categories in the past basically adopts a relativist stance, but integrates formalist knowledge if necessary.

1.4 Linnaean taxonomy and taxonomies in ancient China revisited

Having introduced different taxonomic understandings and approaches, this study intends to treat every kind of taxonomy on an equal term. No single taxonomy is more advanced or correct. Each has its own rationale rooted in a specific corresponding social and historic context. To grasp the matter fully, taxonomy has to be discussed along with the relevant background. Linnaean taxonomy and animal classification in ancient China are revisited here in their respective contexts.

1.4.1 Linnaean taxonomy

Linnaean taxonomy denotes rank-based scientific classification in general. It is credited to Carl Linnaeus (1707~1778) though its present form is not identical to the original eighteenth century concept. Carl Linnaeus organised organisms globally into a ranked hierarchy whereby the natural world was firstly divided into three taxonomic groups: the animal kingdom (*regnum animale*), the plant kingdom (*regnum vegetabile*) and the mineral kingdom (*regnum lapidum*). Kingdoms are further divided into *phyla* (or divisions for plants), which in turn are split into classes, orders, families, genera and species.

The classification can be carried further, with animals arranged into subspecies and plants into *varietas* and *forma*. In the plant kingdom, Linnaeus emphasised sexual characteristics to categorise plants based on the number and the mode of the union of stamens and pistils. The theory of sexuality would be further developed and has become important to the definition of 'species' as 'groups of actually or potentially interbreeding natural population, which are productively isolated from other such groups' (Mayr 1942: xxi). Binominal nomenclature is used to name species. Linnaeus named over 6,000 species of plants and 4,000 species of animals, giving each of them a careful definition and linking them to previous literature so that the same binomial name could be matched to the same concept (Stearn 1959).

After the modern evolutionary synthesis finally took shape in the 1940s, Linnaean classification was reinterpreted against the backdrop of Darwin's theory of evolution integrated with molecular genetics. Linnaean taxonomy, however, has much deeper historic roots.

From a broad social background, the appearance of Linnaean taxonomy in the eighteenth century met the demand for an updated classificatory system needed to include the immense number of new plants and animals being discovered during explorers' voyages to exotic lands and then brought back to Europe. Aristotelian taxonomy, employed throughout the Middle Ages, failed to cover this great variety of newly discovered taxa. Plants could be examined in great detail, especially following the invention of spectacles. Aristotelian taxonomy had not concerned itself with such trivial traits. Linnaeus's system provided a consistent and concise alternative to classification and to place animals and plants in order, which consequently was widely embraced by the scientific community (Stearn 1959).

Economic needs also lay behind Linnaeus's establishment of his taxonomy. Linnaeus himself reasoned his taxonomy as economically-driven (Koerner 1996), writing in 1746, 'the task of economics is to collect [plants] from other places and cultivate such things that don't want to grow [at home] but can grow [there]' (Linnaeus, cited by Koerner 1999: 2). Linnaeus's theory of botanic acclimatisation was driven by his ambition to make Europe as rich as China in terms of plant resources by improving the harvest of exotic crops, which reflects a typical Enlightenment thought of the eighteenth century (Koerner 1996).

Linnaeus's system of classification was grounded in the assumption that God had created nature and put everything in order (Worster 1977: 39). To Linnaeus, God had created the world; his own assignment was merely to 'describe a catalogue into a methodical framework' (Browne 1983). Linnaeus was not alone in this belief, one that firmly embedded in scientists' attempt to rationalise nature since the seventeenth century, when nature was explained and explored as if it was a well-functioned universal machine under the charge of a superior power (*ibid.*: 39-41).

Additional detailed examples indicate the influence of social institutions of his time upon Linnaeus' taxonomy. Schiebinger's research (2003) demonstrates that the Linnaean classification of plants was influenced by traditional notions of gender hierarchy among eighteenth century European society. For example, the class of a plant was determined by the number of stamens, the male parts, while the order of a plant, subordinate to class, was determined by pistils, the female parts. Male parts therefore are given the priority over female parts without any empirical justification.

Overall, Linnaeus's system of classification was intimately related to the European social history of the eighteenth century, characterised by several key concepts including Enlightenment, the voyages of discovery, the development of modern science and so forth. Linnaean taxonomy was therefore an exact expression of this understanding of nature, created through the lens of then predominating social domains.

The relationship between taxonomic groups in the Linnaean system was rethought in the nineteenth century, in the wake of Darwin's publications on the theory of evolution. The principle of common descent, stating that living organisms are all related and have descended from a common ancestor with modification, further justified the 'groups-nested-within-groups' structure of Linnaean taxonomy, and further explained why this taxonomic arrangement was more appropriate than others (Queiroz 1997). The theory of evolution is primarily used to explain biological principles in the natural world. However, it always gives consideration to social, economic and political aspects. For example, natural selection was applied to social domains in the nineteenth century to justify war as a natural necessity for international selection, an excuse for the relentless warfare during that time period (Hawkins 1997: 195).

In brief, it has been illustrated that both Linnaean taxonomy and Darwinian evolution have been embedded deeply in their own particular historic contexts and shaped by social values. Despite the fact that the theory of evolution is accommodated well within Linnaean taxonomy, Queiroz (1988) views this compatibility as 'a logical consequence of the way in which taxa traditionally have been conceived' rather than reflecting objective truth about the natural world. This statement seemingly becomes even stronger when taking genetics into account, which, if necessary, can break down the basic taxonomic unit (*i.e.* species) to the molecular level. Linnaean taxonomy is widely adopted not because it is 'truer' but rather because as a consequence of the course of history and due to prevailing demands among scientific groups.

1.4.2 Taxonomies in ancient China

Ancient China appears not to have had one particular predominating taxonomic scheme. The earliest records on animal categories date back to the late Shang dynasty (ca.

1200 ~1000 BC) though information recorded on oracle inscriptions, a type of divination texts carved on bones, was fragmentary and inconsistent. As a matter of fact, in ancient Chinese texts animals were rarely discussed as major topics themselves (Sterckx 2002: 21).

A good example of this is provided by the 山海經 *Shanhaijing (Classic of Mountains and Seas)*, a Chinese classical text completed around the time of the early Han Dynasty (206 BC- 220 AD). The main contents of the book are divided according to geographical categories, where information about plants and animals can also be found. The book's 18 chapters focus on specific mountains and seas. In addition to recording their geographic locations and features, the book also lists many of the spirits, animals, plants and magical objects found within these mountains and seas, among which 291 animal taxa are listed (Guo *et al.* 1999: 37). The records for these animals are attached to the descriptions of the terrestrial location, which are perceived as 'homes' for them (Dorofeeva-Lichitmann 1995). Thus the classification of the animals in the book follows their geographical spatial distribution, in turn believed to represent the symbolic scheme behind the ancient Chinese's perception of the universe rather than a realistic account of the geographic distribution of the animals (*ibid.*).

Another source of animal categories in ancient China is 爾雅 *Erya (Ready Rectifier)*, the oldest Chinese encyclopedia discovered to date, comprising chapters dating from the Spring and Autumn period (771~476 BC) to the Han dynasty. The 2094 entries in the book are divided into 19 chapters. Each chapter is devoted to explaining a particular category including abstract words, kinship, architecture, utensil, musical instrument, astronomy, geography, hill, mountain, river, grass, tree, insect, aquatic creature, bird, beast and domestic animal. The final seven chapters deal with plants and animals, and are considered a valuable document of natural history in ancient China. Animals are arranged into five categories: insects, fish, bird, beast and domestic animals. Wild animals here are separeated from livestock. *Erya* indeed represents 'a kind of thesaurus or compendium of what are often cryptic glosses that were probably in origin annotations to passages in early texts' (Coblin 1993). As Sterckx (2005) puts it, 'the study of how to differentiate categories' prevails over 'zoology, the internal analysis of the categories themselves'. Rectification of nomenclature, rather than the actual classification of the animals themselves, was the primary goal of the book.

Atran (1990: 18) speculates that in early China a 'systematic attempt at taxonomic organisation' of animals was absent. This statement would only be true if the 'taxonomic organisation' solely referred to a Linnaean-like hierarchy. The organisation of each scheme is systematic and internally consistent although the classificatory criteria might have not concerned animals as biological entities themselves. For example, in the *Shanhaijing* animals are consistently arranged corresponding to the locations of

Table 1.1 Classificatory model of animals with associations of phase, season, direction and colour in ancient China (Sterckx 2002: 79)

Animal category	Phase	Season	Direction	Colour
Scaly 鱗	Wood	Spring	East	Green/blue
Feathered 羽	Fire	Summer	South	Red
Naked 臝	Earth	Late summer	Center	Yellow
Hairy 毛	Metal	Autumn	West	White
Armored 介	Water	Winter	North	Black

their 'homes' and the classification systematically follows geography. Each taxonomy was rationalised by its specific cultural configuration.

There are actually many more taxonomies intertwined with classifications of other objects. One prominent animal classificatory system of the Han dynasty corresponds to the arrangement of 陰陽 *yinyang* and 五行 *wuxing* (the five phases) (Sterckx 2002: 72). Under this model, animals are categorised according to their covering of the skin and their categories are correlated to phase, season, direction and colour, as shown in **Table 1.1**.

On the whole, most books mentioning animal taxonomy explicitly note that animal categories are directly linked to categories of other tangible or intangible objects. It seems self-evident that natural domains were always associated with social domains. As a consequence, our understanding of animal categories in ancient China should not be isolated from their historic and social contexts.

1.5 Problems of cross-reference

As has been illustrated above, both Linnaean taxonomy and classification in ancient China above grew from their own contexts. If we take a relativist stance and perceive different taxonomic systems on an equal footing, it is inappropriate to force one taxonomy to fit into an entirely irrelevant setting where another taxonomy should have belonged. In the field of zooarchaeology then, imposing a Linnaean taxonomy onto ancient societies makes cross-reference problematic.

1.5.1 Over-identification and under-identification

The first issue concerns over- and under-identification resulting from structural asymmetry between taxonomies. As clearly illustrated by Berlin and his colleagues over the course of several publications (*e.g.* Berlin *et al.* 1973; Berlin 1976), folk categories do not always individually correspond to a Linnaean scheme. As a result, both over- and under-identifications occur when examining correspondences.

Characters from oracle bones provide one example. Oracle bones were scapula bones of ox and ovicaprids, and turtle shells prepared, inscribed, fired and interpreted for divinatory purposes in China during the late Shang dynasty. The wide range of questions are addressed to

deities on oracle bones covers auguries concerning the weather, harvest, military conquer, hunting, fortunes of royal families and so forth (Keightley 1978: 33-5). Recognition of animal categories inscribed on oracle bones in the Shang dynasty provides an example of how over-identification can come about. Three characters that were found carved Shang oracle inscriptions – 鹿, 麇 and 麋 – have been identified as denoting sika deer (*Cervus nippon*), muntjanc (*Muntiacus sp.*) and Pere David's deer (*Elaphurus davidianus*) respectively. The interpretation follows the stroke at the top of each character, interpreted as representing the presence or absence of, number and size of the animal's antlers in real life (Campbell 2005; Fiskesjo 2010). Whilst true that morphological differences of antlers are observed among these three species, these distinctions do not take into account the changing morphology of antler resulting from seasonal changes and animal growth. The images depicted by the three pictograms are therefore too ambiguous to point to any clear distinction, especially when the variety o oracle inscription writing styles is also taken into consideration – for instance, one character might have been written in slightly different forms by different diviner groups (*cf.* Keightley 1978).

Under-identification is also problematic. The lowest taxonomic group in the Linnaean hierarchy may not be sufficiently detailed to reflect past folk categories. Take, for example, the case of dog remains found at the Maya site of Colha om Belize. According to Linnaean taxonomy only one dog species, *Canis lupus familiaris*, was identified at the site. Their dietary consumption and spatial deposition at Colha, however, are indicative of a further division of the species beyond the definitional capabilities of the *Canis lupus familiaris* label (White *et al.* 2001).

Both examples above are the result of an indifferent application of Linnaean taxonomy to past human groups that disregards any compatability with how the animals were viewed and classified. As an analogy, we might compare taxonomy to a microscope whereas animals are the objects observed. Different taxonomies use different magnifications. As a result, one may observe one pattern of the object under one magnification and another under a different one. What our eyes are able to capture depends on the magnification under which the observation is operated. A muddle of various taxonomic magnifications runs the risk of misplacing the interpretation in a labyrinth of time, space and ideology.

1.5.2 Changeable category

Under the Linnaean system, one group of animals occupies its unique position in the hierarchical ranking system. Once an animal has occupied a position in the system, it must not be placed under another group within at the same rank. Taxonomic boundaries are thus solid within the Linnaean system.

In other classificatory systems, however, animal categories may be mutable. One object can be allocated to one or another category depending on a number of factors, including situation, participants, time, and space. Ellen (2006), for example, cites the classification of cassowary of Nuaulu people from Indonesia as evidence to support cross-classification depending on social context, given that the cassowary is placed alongside birds and bats in the category of '*manue*' on one hand, and on the other hand, it can also belongs to '*peni*', a category of ritual game that includes pig and deer. The category of the cassowary is interchangeable depending upon the social event within which this animal is discussed/exploited.

In the context of Chinese archaeology, there are also examples of categories that depended on the combination of the objects. During the Shang dynasty horses and chariots together were probably perceived as a 'compound entity' and formed an isolated category distinct from either animals or vehicles (Campbell 2015). This category was represented by their associated burials found in the great Shang settlement at Anyang and linguistically the appearance of the counter word 丙 '*bing*' (pair) implying the sense of 'paired things' (*ibid.*). Horses were considered as domestic animals during the eastern Zhou dynasty (770~255 BC), as suggested by the mention of 六畜 *liu chu* (six types of livestock) in several pre-Qin documents. Although the category of horses in the Shang Dynasty has not been entirely solved, Campbell's re-depiction of the intertwining relationship between animals, material culture and social perceptions is an inspiring beginning.

1.5.3 Animals excluded from Linnaean taxonomy

The last issue concerns animals not covered by Linnaean taxonomy but classified within other systems. These animals are conventionally called 'fantastic beasts', implying that Linnaean taxonomy alone tell the truth about animals. The term 'fantastic', associated with unreal and imaginary further emphasises their absence in Linnaean taxonomy. It is the presence of such animals in other taxonomies instead that is of interest to us here. These animals may not turn out to be as 'fantastic' as their name implies if their categories are understood in association with their particular contexts and from an emic perspective.

In the case of China, dragons are the most frequently cited animals of this type. While certainly excluded from Linnaean taxonomy, it remains unexplored why they appeared in ancient taxonomic systems in China in the first place, and how people in the past perceived them. It is known that dragons were intimately linked to horses. For instance, during the Zhou dynasty, a horse taller than eight *chi* (Chinese feet) was called a 'dragon', as recorded in 周禮 *Zhouli (Rites of the Zhou)*. Later in the Han dynasty, the horse was considered as the heavenly dragon's *alter ego* on Earth (Sterckx 1996). It seemed no particular distinction was made between a dragon and a horse. Both of their existences and categories could be rationalised within the particular taxonomic system which Linnaean taxonomy does not even acknowledge 'dragon'. In Medieval Europe, *Scala Naturae* includes angels and God alongside plants, animals. The Angels and God are included because medieval people believed in their existence. Are they conceptually distinct from the dragon in China? Using Linnaean taxonomy may leave no space for us to explore those animals that are excluded from the system but which occupy positions in other taxonomies.

1.6 Setting of the book: research question, region and period

The above has provided a broad introduction to the existing scholarship on folk taxonomies. As addressed above, taxonomies invariably have their roots in particular social and historical context. This opens up a venue for this current study to explore folk taxonomies in ancient China through the lens of archaeology.

The research question is largely concerned with methodology: what methods can be used to approach folk animal categories in the past through zooarchaeological data? Given the scarcity of previous studies on this subject, it is a new methodology that has to be built up. Several extant zooarchaeological methods aid the interpretation of faunal remains and each is adequate in its own way for providing sufficiently detailed information. Therefore it would be reasonable to take a conventional route sticking to these pre-existing methods, while stepping back to beg the question anew. Efforts are devoted to integrate various lines of evidence and contextualise information in order to produce a new method of interpretation.

To address this research question, a case study ideally needs to possess the following attributes. The first attribute concerns the separation of indigenous classificatory systems from Linnaean taxonomy. Separating folk taxonomy and the Linnaean system will make it easier to limit the latter as an analytical tool only. Beyond taxonomy, the separation also implies avoiding any extensive communication between the indigenous society and the Western world that roots Linnaean taxonomy. Secondly, the possibility of using information on animal categories in the local texts need not be ruled out in the case study. Though language is not used as direct evidence, it provides supplementary data which the taxonomy inferred from the archaeological assemblages may be referring to. Thirdly, instead of linguistic evidence (*i.e.* nomenclature), this project aims to explore classification in the past by examining objects for categorisation – that is, animals themselves, found in the form of rich faunal assemblages in a relatively good

Table 1.2 A brief chronology of early China, from the Neolithic to Han dynasty in the region of the Central Plains (research period highlighted in grey)

	Period	Dating (ca.)
Early Neolithic	Peiligang	7000 ~ 5000 BC
Middle Neolithic	Yangshao	5000 ~ 3000 BC
Late Neolithic	Miaodigou II	3000 ~ 2500 BC
	Late Longshan / Wangwan III Phase	2600 ~ 1900 BC
	Xinzhai	1850 ~ 1750 BC
	Erlitou	1900 ~ 1500 BC
Shang dynasty	Erligang	1600 ~ 1400 BC
	Yinxu	1400 ~ 1050 BC
Western Zhou dynasty		1045 ~ 771 BC
Eastern Zhou dynasty	Spring and Autumn period	771 ~ 476 BC
	Warring States period	476 ~ 221 BC
Qin dynasty		221 ~ 206 BC
Han dynasty	Western Han	206 BC ~ 9AD
	Eastern Han	25 ~ 220 AD

state of preservation. These three attributes allow us pin down the research region in Central China during the late Neolithic and early Bronze Age.

Unlike the situation in Europe, where the historical origin of Linnaean taxonomy can be traced back to ancient Greece and even earlier (Hopwood 1959), Chinese prehistory stands free from the development of the modern biological taxonomy. Besides, the consistency within the Chinese writing system makes it possible to recognise textual data from ancient times where folk taxonomies might have been recorded. China is therefore selected as the research region. Chronologically the research period is set between the late Neolithic and early Bronze Age. Earlier periods are not covered because the possibility of cross-reference to local textual records is ruled out in earlier prehistory. The enquiry ends in the Bronze Age given that there were increasing contacts between the east and west after this period, and so isolation of Chinese taxonomy is no longer guaranteed. **Table 1.2** briefly summarises the chronology of early China from Neolithic to the Han dynasty, focusing on the Central Plains region. The research period lies between the late Longshan period to the early Bronze Age.

More precisely the analysis focuses on the Central Plains region (**Figure 1.1**), where extensive and exhaustive archaeological excavations have been conducted and there is rich information about faunal assemblages. The Central Plains region is located on the lower reaches of the Yellow River in central China. Nowadays the region stretches out over Henan Province, south Hebei Province, south Shanxi Province and west Shandong Province. Historically, this area is believed to be the cradle of Chinese civilisation and s the political seat in most dynasties before the Song dynasty (960~1279 AD). Archaeologically, discoveries of sites spanning from the Palaeolithic to the very late Song dynasty also evidence the long cultural sequence of the region. Many important sites that witness vital changes in prehistory/history were recovered in this area, such as Jiahu site with its evidence of early animal domestication (HPIACR 1999), the Middle Neolithic village of Yangshao (Yan 1989), the Great Shang settlement of Anyang (Institute of Archaeology CASS 2007), to name just a few.

Chronologically the late Neolithic and early Bronze Age spanned from the Longshan period to the Erligang period (see **Table 1.2**), which represents a vital stage along the trajectory finally leading to the establishment of the cultural and political entity that is conventionally called 'Chinese civilisation'. As summarised in chapter five, a series of changes occurred during this period, marking an epochal departure from the preceding periods and profoundly influencing subsequent periods. These include the fortification of settlements, settlement hierarchy, intra- and inter-regional exchange, demographic migration including military excursion, emergence of a writing system and so on.

Three sites in particular, located in the Yi-Luo River basin on the Central Plain, are selected for study:e Wadian, Wangchenggang and Xinzhai. **Figure 1.1** highlights the location of the Central Plains and points out the location of the three sites in the map. These three sites chronologically fall into the same timespan – from the late Neolithic to the beginning of the Bronze Age (**Figure 1.2**).

This study examines materialised traces of taxonomy instead of linguistic evidence. The study materials hence are faunal remains — those objects themselves that were categorised. Four taxa are of main focus: pig (*Suidae*), deer (*Cervidae*), cattle (*Bos taurus*) and sheep/goat (*Ovis aries/Capra hircus*).

A series of specific questions pertaining to taxonomy in ancient China are put forward. Grasping the fact that
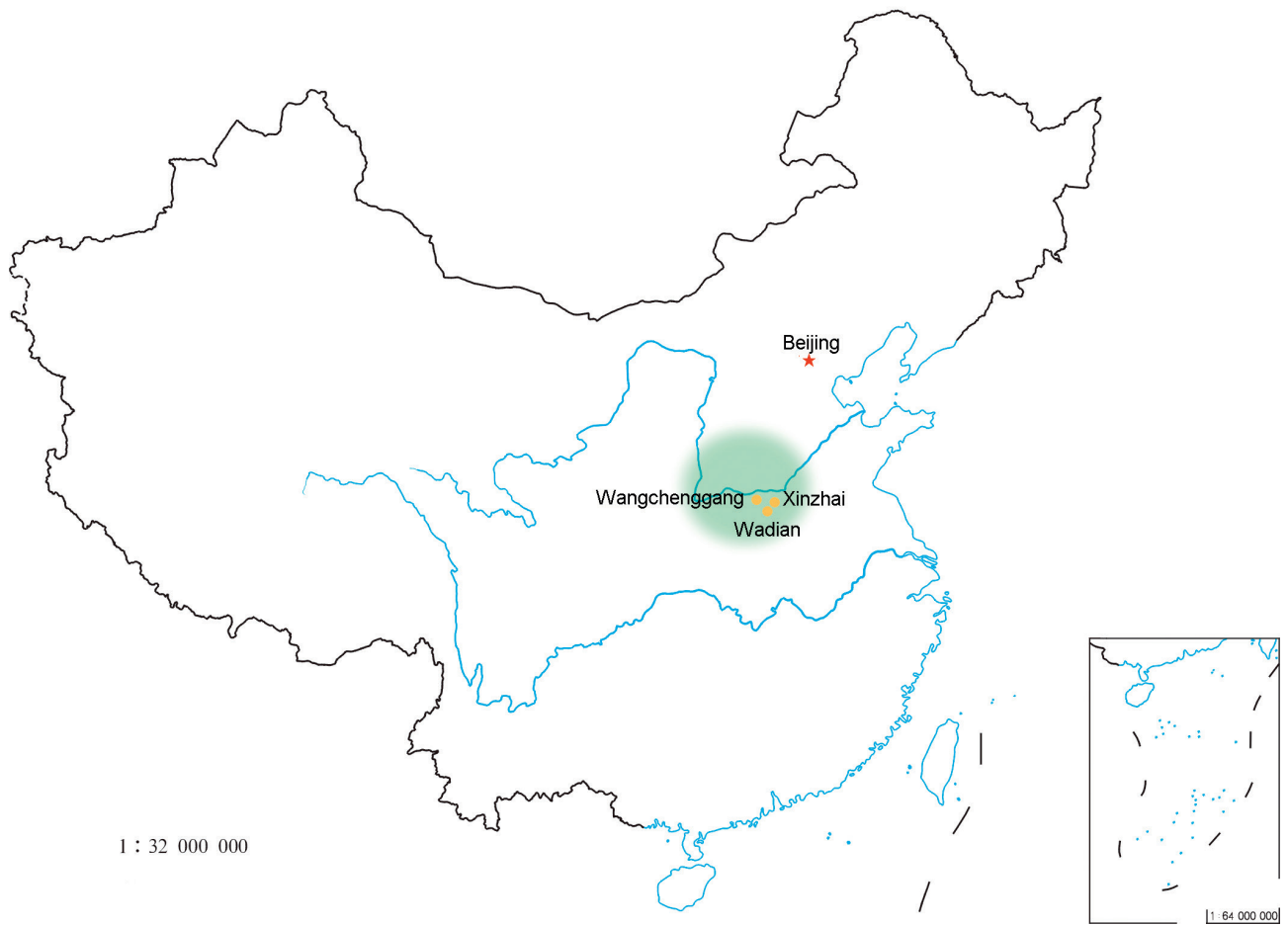
Figure 1.1 Map of China, showing the location of the Central Plains and the sites for study.
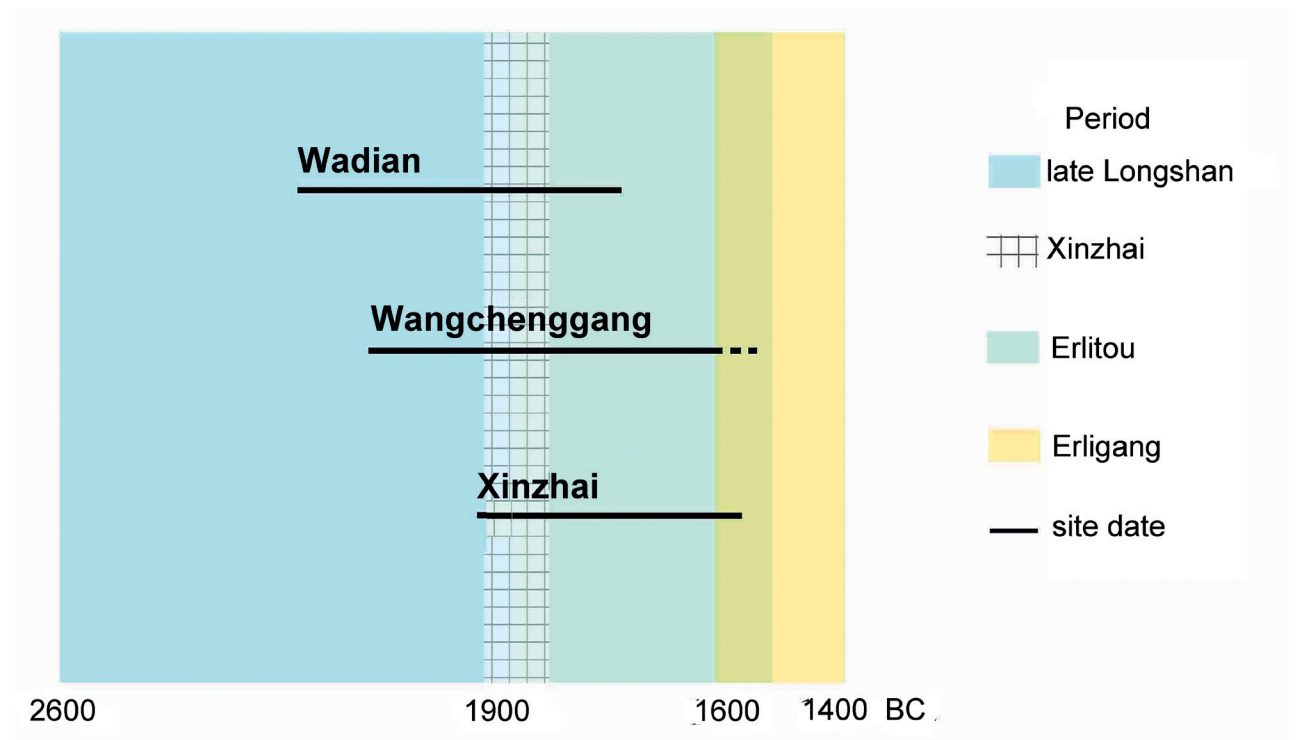

Figure 1.2 Chronology of the study sites

a reconstruction of the whole picture of a classification system in the past would be too ambitious for the current research, we approach certain more specific aspects instead. The questions under consideration include: what was/were the criterion/criteria used to categorise animals in ancient China? What was the context in which one or another taxonomy was used? By exploring these specific questions pertaining to this case study, it is hoped to provide potential solutions to the research question: how the archaeology of animal bones can inform us about folk taxonomies in the past.

1.7 Research themes

The book is organised around four themes. These key themes and their interconnections provide a vital thread to articulate taxonomy, archaeology and language and set the agenda for this research.

1.7.1 Etic and emic: two perspectives

'Etic' and 'emic' denote two contrasting perspectives to conduct research. While there are subtle differences between the definitions proposed by different anthropologists (*e.g.* Pike 1967; Goodenough 1970; Harris 1976), broadly speaking, an etic perspective conducts studies through anthropologists' – the observers' – point of view. An emic perspective, on the contrary, puts weight on internal observations and interpretations made by members of a culture and attempts to explain ideology and behaviour of a social group according to indigenous criteria (Barnard 2002). In other words, the two stances address questions from different levels: the former aims at a generalisation of universal principles while the latter focuses on justifying cultural institutions within cultural systems.

In zooarchaeology, using Linnaean taxonomy to identify faunal remains is to categorise animals from an etic perspective as the classificatory criterion — Linnaean taxonomy — is thought universally valid and appropriate to scientific research. This etic operation, on the one hand, entails cross-cultural comparisons about exploitation of animal resources whereas on the other, leaves out indigenous perceptions of human-animal relationships configured by cultural specifics. The indigenous perception, however, is the very area where an emic approach is promising.

The problem explored in this book is thus emic-oriented, that is, instead of placing animals into Linnaean taxonomy, interpretation is devoted to situating animals upon the intellectual map of past societies and rationalising the mapping within the particular context. The processing of data is still etic involving theoretical and methodological constructs intrinsic to archaeology (Berry 1989). The mutual tension is thus negotiated and it is exactly under this negotiation that this project sets forth its research inquiry and builds up its methodological framework.

1.7.2 Formalism and relativism: two approaches

The second theme dwells on formalism and relativism, the two contrasting approaches to study folk taxonomy in anthropology. Formalists, emphasising structure of a taxonomy over its contents, are devoted to eliciting universal characteristics shared by taxonomies all over the world, whereas relativists, criticising formalists' ignorance of cultural specifics, advocate that taxonomies are a kind of cultural institutions, indispensable from particular social and historic contexts (Atran 2001).

By reviewing their theoretical foundations and applications, this book clarifies the divergence manifested in opinions towards Linnaean taxonomy: for formalists who believe in a single reality, Linnaean taxonomy is deemed closer to the order of 'nature' in the world, while relativists argue that Linnaean taxonomy is no truer than any other taxonomies in that it was also constructed in a particular social and historic setting. In other words, all taxonomies are treated on equal terms from the relativist standpoint. The relativists' equivalent view of taxonomy revokes the employment of Linnaean taxonomy as the absolute truth and hence proposes the engagement of context in the study of taxonomy.

Following the thread of the discussion, this theme is to be fully developed in chapter two. By unfolding this theme, the relativist stance aims to interpret archaeological evidence anew and attempts an adequate comprehension of local categorical knowledge in the past.

1.7.3 Language and action: two pathways

Nomenclature is often employed as the proxy to study taxonomies. Both the formalist and relativist approaches mentioned above, for example, enquire into categorical names to decipher taxonomies. Categorical names are shaped by taxonomy. For example, binomial nomenclature in the Linnaean system is indicative of taxonomic hierarchy. At the same time, action is also informed by taxonomy. Looking around, one can easily find taxonomies expressed in the form of physical behaviour and material representation - shelving in the supermarket, books in the library, the layout of a zoo, *etc*. As archaeologists explore every kind of cultural practice and material product, an important hypothesis underpinning the whole of this research is hence proposed here: taxonomy informs action, and that action can be discerned in archaeological depositions. This proves the methodological potential other than through the linguistic pathway to decode taxonomies in the past.

Throughout the book, the relationship between archaeological assemblage, human behaviour and taxonomy is to be unpacked in great length. A comprehensive dissection of archaeological deposition and its relationship with behaviour and taxonomy, which I hope is clearly demonstrated in chapter three, is central to formulating an archaeological method guiding the

research. This non-linguistic pathway is to be further illustrated by a number of cases studies. Finally textual/language references, if available, are used to further test the hypothesis in addition to archaeological evidence.

1.7.4 Domesticated and wild: two categories

'Domestication' has been, and continues to be, a prominent topic in archaeology. More precisely, it is the domesticating practice rather than the category of 'domestication' that has been extensively studied. Domestication as a practice represents an important change in human lifeways. The split between hunting and husbandry, wildness and domestication, however, is envisaged within a nature/culture dichotomy which itself is posited in the frame of Western concepts. The notion of 'wild' itself is a subject of dispute (Anderson 1997).

In zooarchaeology, a growing body of evidence regarding human-animal relationships has challenged this dualistic paradigm (Russell 2002). The division between the two may not be as rigid as conventionally conceived. Given the ever-changing definition of 'domestic animals' as manifested in, for example, medieval categories determined by animals' economic contribution to human society (Thomas 1983: 20) and Darwinian 'domestication' denoting selective breeding as an analogy to natural selection, my own conjecture is that a category of 'domestic' is created with reference to social and historic contexts and the dualism stereotype prevents a comprehension of indigenous perceptions of animal categories. Domestication of animals indicates a method to utilise animal resources. It does not necessarily have had to co-occur with a radical change in the way people viewed and ordered the world. Consequently, it runs the risk of equalling the identification of domestic animals according to Linnaean taxonomy with the creation of 'domestic' categories in ancient minds. As a matter of fact, the possibility that the wild/domestic division was absent in certain prehistoric groups cannot be easily dismissed.

Taking a relativist stance in this book, the wild/domestic dichotomy embedded in Western epistemology is to be deconstructed and reconstruction of local forms of 'domestic' and 'wild' categories is attempted by interpreting archaeological assemblages with their context *in situ*.

1.8 Structure of the book

This book is comprised of eight chapters. The present chapter, chapter one, explains the motivation behind this research and introduces both anthropological and archaeological approaches. By critically reviewing the existing scholarship, the brief history of Linnaean taxonomy and animal classifications in ancient China are revisited, rendering examples to argue for an intimate relationship between taxonomies and their particular cultural context. The recognition of this intertwining relationship alerts us to the risk of cross-referencing taxonomies and thus urges

an exploration of animal classifications from an emic perspective. The research design is also presented in the introductory chapter.

Chapter two brings methodological issues into the discourse, attempting to bridge the gap between archaeological assemblage and taxonomy. Illustrated by a hypothesised example about the burial of a pet cat burial, the discussion thoroughly dissects the relationship between taxonomy and deposition, institution and agency. Intentionality appears salient to identify taxonomic depositions. The twin burial of a human and a lamb found at Çatalhöyük follows, serving as the archaeological example to be interpreted with the concern of animal categorisation. Two key concepts — contextual archaeology and structured deposition — are critically reviewed and refined to make them useful tools to decode folk categories. These two notions together guide the brick-by-brick building-up of the precise analytical methods addressed. In addition, a brief summary of the faunal assemblages under study is also found towards the end of this chapter.

More information pertaining to the sites and the assemblages under study is described in chapter three, which introduces the archaeological background of the Central Plain during the late Neolithic and early Bronze Age. On one hand, in this chapter I venture to present a synthesis of archaeological discoveries and interpretations of the study period and region. On the other hand, I explore the making of these interpretations associated with the variation in methodology and matching academic atmosphere. In this manner, the existing scholarship of archaeological studies of the research region and period is critically reviewed.

Chapters four, five and six present three case studies, each comprising an introduction of the site, a section on the result and a discussion. These interpretations are brought together and expanded in chapter seven. Three issues are discussed: classification of 'human', age-related classification and wild-versus-domesticated division. The discussion moves on to a broader scale integrating multiple lines of evidence (*e.g.* ancient texts) in order to comprehend animal categories against a wider temporal and perceptual context. For comparative studies, animal classification beyond China is briefly included.

In chapter eight, conclusions and future works are summarised. The monograph ends with a short discussion regarding its contribution to archaeology and beyond.