

‘GETTING CANED?’ ASSEMBLAGE THEORY AND THE ANALYSIS OF CANE MATERIAL FROM CALIFORNIA

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Assemblage Theory proposed by DeLanda (2006) argues that an assemblage is made up of the specific interaction of components and the combination of these components is how agency is expressed. Agency is determined by capacity; the potential a component has. Assemblages should be viewed as multi-scaled. Recent calls by Normak (2010) argues that Assemblage Theory needs to be operationalised into a robust method that archaeologists can use. This paper outlines an experimental method that focuses around a capacity analysis while proposing a Multi Scale Capacity Analysis Model. To test this model a case study of carrizo cane used by the Chumash of Southern California is examined. Recent discoveries from a Californian cave system called Cache Cave has found an abundance of this material. Combined with other carrizo Chumash artefacts, the aim of the study is to establish if Assemblage Theory can be used to understand the carrizo in Cache Cave. The study found that by using the model it was shown that carrizo was being stored and processed in Cache Cave in part as a response to technical attributes of the carrizo itself which offers a wide range of possible uses, but also due to complex environmental effects. This indicates a certain level of social organisation, understanding of the landscape, and possibly the means to have social standing through the control of raw and semi-processed resources.

“For it has been the rule among us that anything that has been obtained by the use of the bow and arrow cannot be claimed by anyone else, for wherever the arrow strikes, that is the sign of the power of man” (Blackburn 1975)

The quote above is an extract from *December’s Child* (Blackburn 1975). This quote highlights how past societies may have had a different relationship with material culture, that archaeologically is difficult to determine. To overcome this, archaeologists adopt a range of theoretical techniques to try to incorporate past societies’ understanding of the material world.

Theory within archaeology has been developed throughout the history of the discipline encompassing many paradigms; from culture history to processualism to post-processualism. One of the latest positions is new materialism, a posthumanocentric view that not only humans but the material world can have agency (Normak 2010). The latest theoretical framework that holds this view is Assemblage Theory (DeLanda 1997, 2002, 2006, 2011; Deleuze and Guattari 1987).

THEORETICAL FRAMEWORK

Assemblage Theory rejects the Aristotelian idea of essentialism (DeLanda 2006:26-28). Essentialism is the idea that things have a set of metaphysical characteristics which make them what they are and that essence occurs before existence (Cartwright 1968). Instead, DeLanda (2006) argues that entities, from water molecules, to storm clouds, to animal intelligence, to human society, each emerges in the world through the specific interaction of components in what can be termed an assemblage. Importantly, the components that make up an assemblage can recombine with other components to form a new or different assemblage, thus change occurs. For example, a bow and arrow can first be used in a native hunting context, then is deposited in a cache, and then is recovered archaeologically and is finally put in a museum. Equally, different assemblages are the component parts of larger assemblages. An arrow is part of a weapon, but a weapon is a component of a hunter, and so forth.

One of the major ideas of this theory is that assemblages should be viewed as a multiscale and that the micro is just as significant as the macro; assemblages occur at every level (DeLanda 2011). So, it is in the relationship between components which ultimately determine the overall assemblage. This is

where agency exerts itself: in the manner in which different components interact. But, as DeLanda is careful to point out, such agency is only due to the capacities that component parts actualise through these interrelationships (DeLanda 2006:10-11). The capacity is the potential a component has based on its physical properties. When a component has fulfilled one of its capacities it has been actualised. For example, a blade's physical property is sharpness and so it has the capacity to cut, but the blade is not actualised until cutting specifically takes place.

In more simple terms, an assemblage is made up of components and the interaction of these components determine what the assemblage is. Change can only occur when components recombine into something different or new. The way that components interact determines the capacity, when capacity is achieved it has been actualised. This all takes place on multiple scales. It is because of the scalability that Assemblage Theory can look at the person, an organization, cities, or states (Robinson 2017). This is particularly useful to archaeologists as there is an emphasis on the importance of materiality and its numerous capacities as an active force in human history (ibid).

METHOD

To investigate how Assemblage Theory can be operationalised this research puts forward a model by using the case study of *carrizo* particularly as used by the Chumash.

The term "*carrizo*" was coined by the Spanish to describe three types of large grass species (Timbrook 2007:137). There are two native grass species; Common Reed or *Carrizo* Grass (*Phragmites australis*), and Giant Rye (*Leymus condensatus*) (Timbrook 2007:11, 137). There was also an introduced species called Giant Reed (*Arundo donax*) (Timbrook 2007:3). The three "*carrizo*" species could be interchangeable for certain purposes (Timbrook 2007:3).

Carrizo was a widely utilised plant type across the American west and indeed elsewhere. Kiviat and Hamilton (2001: 346-347) summarize the Chumash uses of *carrizo*:

- Sugar
- Whistle
- Thatching
- Apron
- Counting sticks for games
- Cigarette (tubular pipe)
- Tabaco container
- Splint for fractures
- Knife
- Paintbrush handle

Many of the artefact types are only known ethnographically, mainly because they would not typically survive archaeologically; such as, as splints, drinking straw, and cigarettes. For an in depth discussion of *carrizo* use by the Chumash see McArthur (2016, Chapter 3.3).

DATA

Data was collected from an interior cave site called Cache Cave, where *carrizo* as so far come from three large rock shelters. An estimated 20,000 finds have been found within the cave system. Dating evidence from site so far suggests that it was abandoned during the Medieval Climatic Anomaly (MCA) and its use increased after the MCA ended. The current estimate for cane-like material is over 673 fragments. Seventy-eight fragments have been found in Cave 1 and 568 found in Cave 2. Despite Cave 3 being the only cave fully excavated, only 27 fragments were found. A vast quantity of this appears to be raw cane material, mostly fragmented, and was brought into the cave for unknown reasons. There are some artefacts made of *carrizo*, including a cane bundle, a near complete arrow shaft, and a possible broken arrow shaft. One hundred twenty fragments of raw material, one arrow fragment, and 15 fragments from the cane bundle were analysed.

Data was also collected from cane fragments and cane arrows currently in the collections at Santa Barbara Museum of Natural History, with permission from John R. Johnson, Curator of Anthropology. Four fragments of raw material, and 12 arrows from various locations (see McArthur 2016) were analysed. One of the cane arrows was part of an arrow making kit and two were from a hunting assemblage.

Data Analysis

Analysis consisted of metrics being taken for:

- A. Length and width.
- B. The types of break
- C. Whether leaves are present or are not present on the cane
- D. Evidence of potential working

Figure 1 is a schematic to illustrate the proposed model of this research. The Multi-scale Capacity Analysis Model uses the concept of capacities, and applies it to multiple scales. This model breaks down a piece of material culture into differing parts based on scale in terms of components:

- A. The first stage of the model is to look at the fundamental structure. The fundamental structure is the base component of an assemblage. In this case it is the microscopic structure of *carrizo* cane (of course, if one is looking at an atom as an assemblage, the fundamental structure would be at the sub-atomic scale). To investigate this stage a scanning electron microscope or SEM was used as it allows the possibility of viewing a cane sample at 500 times magnification. As the SEM requires small samples only a specimen of *Phragmites australis* was looked at rather than a piece of an artefact. The structure of the cane will determine its physical properties.
- B. The second stage of the model is to look at the individual properties. This stage is interested in the physical properties of a single component and its resultant capacity. To do this a 3D colour microscope was used to look at the different parts of the cane sample. This technique is not destructive and so a potential arrow shaft has been looked at. The difference between this stage and the previous stage is that individual properties is concerned with the how the different parts of the cane interact to give it certain properties. For example, *carrizo* cane may be hollow to make it lighter to move in the wind. The individual properties may, or may not be a reflection of the fundamental structure. Ultimately, fundamental structure and individual properties are similar but at a different scale; the microscopic properties, and the physical properties.
- C. The third stage of the model looks at how components come together to make an entity (or an assemblage). This looks at the capacity of a group of individual components which form a larger entity. One of the most important aspect of this stage is that the previous two stages should be conducted for every component within the assemblage. This is to say that in the case of an arrow the fundamental structure and individual properties should have been established for the stone point, wooden fore shaft, the cane main shaft, the deer sinew, and the feather fletching. An arrow is an assemblage made up of these components. This means that the coming together of these components allows for new capacities to be established.
- D. The final stage of this model is to look at the wider collective properties. This allows considering the capacity of an entity made of other entities which each are made up of complex components. In the example here, a hunter, is made up of person, with a bow, arrows, and hunting associated clothing. Each of this entities are made up of their own components and so the previous three stage should be fulfilled. This stage can be multiple. In this case the first wider collective is a hunter, the second wider collective will be a group of hunters. Depending on the type of assemblage then this may continue further.

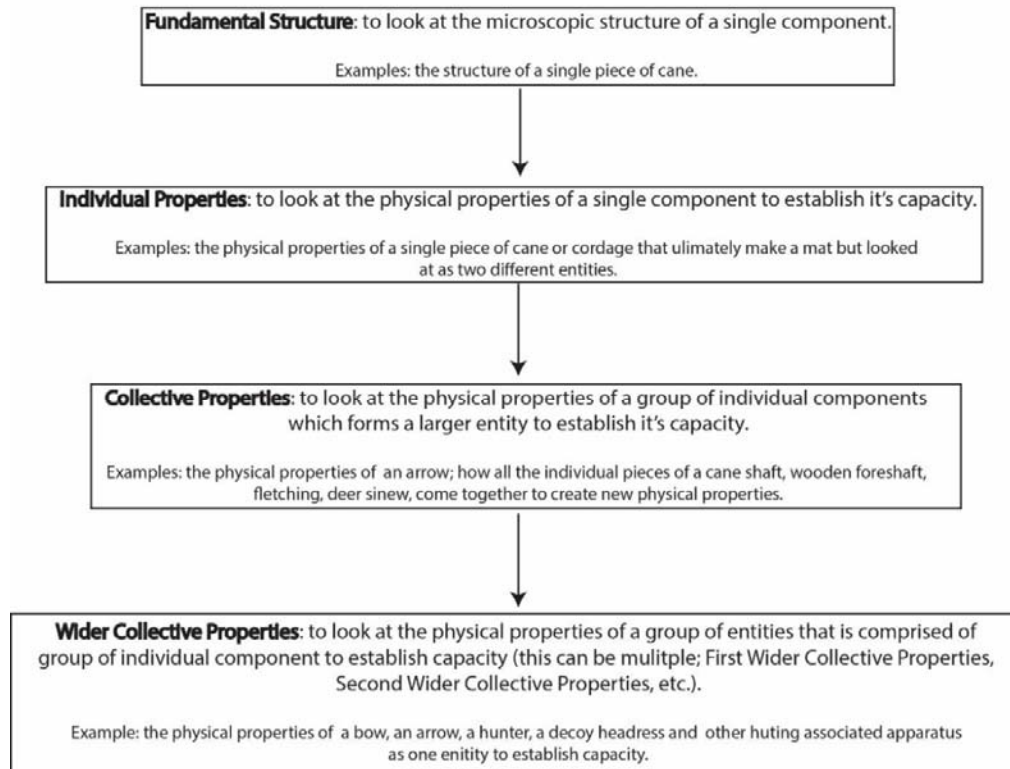


Figure 1. A schematic to show how the Multi-scale Capacity Analysis Model may apply to carrizo cane (produced by Author).

RESULTS

Stage 1

Looking at the structure of the cane in Figure 2 there are two main physical features; the cane is porous and corrugated. These physical attributes will fulfil certain capacities; being porous allows for a stronger structure as the hollowness allows it to be strong yet lightweight, stiff yet bendable to move in the wind. Being corrugated may allow the cane to grow taller and thin.

At this stage the cane's capacity is reflective of its natural need to survive. The *carrizo* cane's properties and resultant capacities are essential to being "cane." The cane needs to grow tall to reach sun light and avoid being submerged, to be hard and strong to avoid being killed, to bend to avoid snapping in the wind, and to photosynthesise to survive.

Stage 2

The analysis of the results from the 3D colour microscope is a continuation of the establishing the structure of *carrizo* cane.

The result of 3D microscope in Figure 3 shows that the *carrizo* is made up of four distinct layers. There is a hard outside layer that has a waxy coating, followed by a honeycomb like layer, a finer honeycomb like layer, and a fibrous filled hollow layer. These physical layers, like those of Stage 1, aid the cane in growing and being strong. The waxy layer protects the cane from water. The hollowness allows the water to pass from the roots to throughout the cane. The honeycomb interior allows the cane to light weight but strong.

The cane fragments only reach Stage 2.

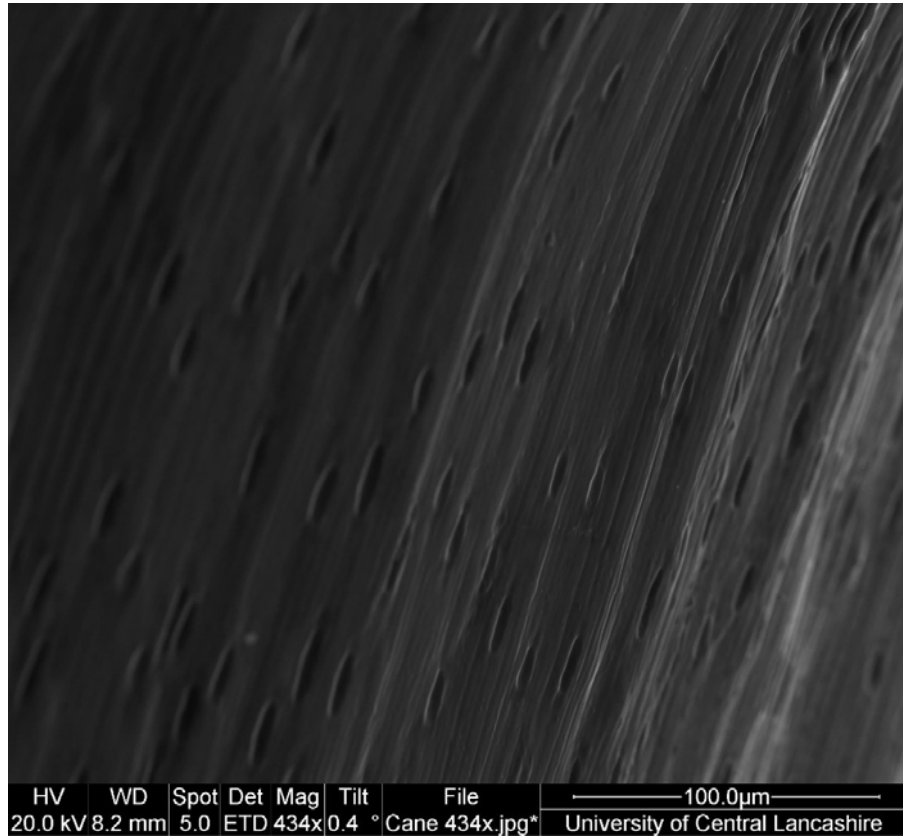


Figure 2. A photograph to show the structure of carrizo cane at 434x magnification (taken by Author).

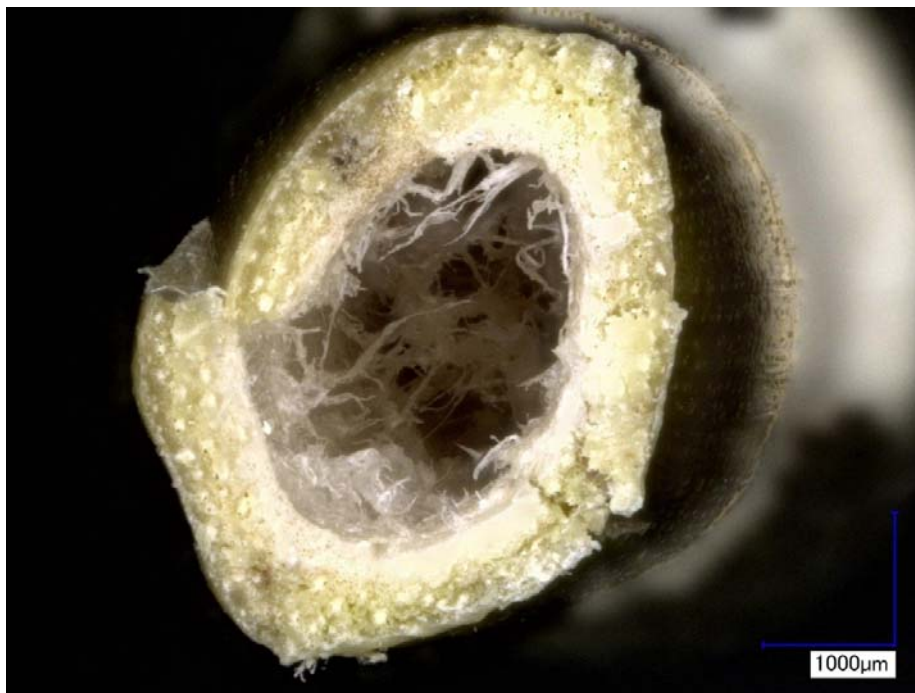


Figure 3. An image to show the four layers that make the carrizo cane shaft.

Figure 4 shows the length of the raw material. The results shows that there is little conformity amongst the length of the cane. The shortest fragment measures at 4.6 cm and the longest measures at 51.0cm. The majority of the cane at 32 pieces are between 10.0 cm and 14.9 cm. There is a concentration of length between 5.0 cm and 34.9 cm which makes up 111 pieces out of the total 120.

Similar to length, Figure 5 shows that width had very little conformity. The thinnest fragments measures 0.2 cm and the widest measures at 5cm, this is huge range in terms of width. Furthermore, the cane fragment which measured at 5cm was the widest *carrizo* cane in the whole data set. Next, the majority of the cane at 29 fragments measures at 0.6cm. Again there appears to be a cluster, this time at 0.3 cm to 0.9 cm; 118 of the 124 fragments fall into this range. The lack of conformity indicates this material may be unprocessed as it suggests that the material has yet to be sorted.

The only types of working which were observed are pinched, and pinched and woven (Table 1). Seven fragments of *carrizo* were observed to have been pinched whilst only one was observed to have been pinched and woven. One hundred sixteen (116) fragments were observed to have no evidence of working at all. Pinched may occur from purpose working but also may be from taphonomic processes. This strongly supports the idea that this material is still in its raw state, or only slightly processed.

The type of breaks represents both the distal and proximal ends. There are a range of different types of breaks present in the raw material (Table 2). Clearly, the vast majority of breaks were observed to be broken at 149 fragments. The number of rough breaks were 29, angular breaks were 43 and straight breaks were 23. No fragments were observed to have notched breaks. This is interesting as the notch breaks are associated with arrows and do not occur naturally. However, the broken break is associated with taphonomic processes from the cane abrading overtime against the soils, and stones within the soil. Considering this, it is possible that notched breaks were once present but have subsequently disappeared.

The data shows that only eight fragments have leaves present, whilst 51 have partial leaves present and 65 have no leaves at all present (Table 3). If the cane was completely unprocessed it would be expected that the majority of cane would have leaves present. However, considering the above evidence the data may suggest only minimal processing has taken place. As the cane is being harvested perhaps individuals are quickly stripping the cane of its leaves before it is being transported.

In terms of capacity, the results of the 3D colour microscope add to the capacity being focussed on in terms of the natural need to survive. The *carrizo* cane's capacity again facilitates it existence to be "cane." The multiple layers, the hollow structure, the waxy waterproofing, all aid the cane in achieving this goal as their collective capacities enable an elongated, strong, yet flexible structure. However, these same capacities are in turn properties with potential to become actualized within a larger assemblage.

Stage 3

Within Stage 3 fall the compound arrows and the cane bundle as clear processing and manufacturing has taken place.

Figure 6 shows that cane from the cane bundle are more uniform in length compared to the unprocessed raw material. Though the longest cane measured at 107.2 cm and the smallest measured at 22.4 cm the majority measured between 41.4 cm and 56.7 cm. If the cane is showing more uniformity than it is suggesting that it has been processed and bundled together for storage. Cane 1 has no length measurement as it was impossible to measure because of the overlapping of cane within the bundle.

The results of the width are similar to length in that they both point towards to more uniformity (Figure 7). The width ranges from 0.4 cm to 0.9 cm. Interestingly there does not seem to be any outliers.

There is also an increase of working present on cane within the bundle (Table 4). Five fragments were bent back on itself, one was associated with cordage, and one had a possible cut mark. Eight out of the 15 had no evidence of working. Compared to the raw material this is significant. The cane that

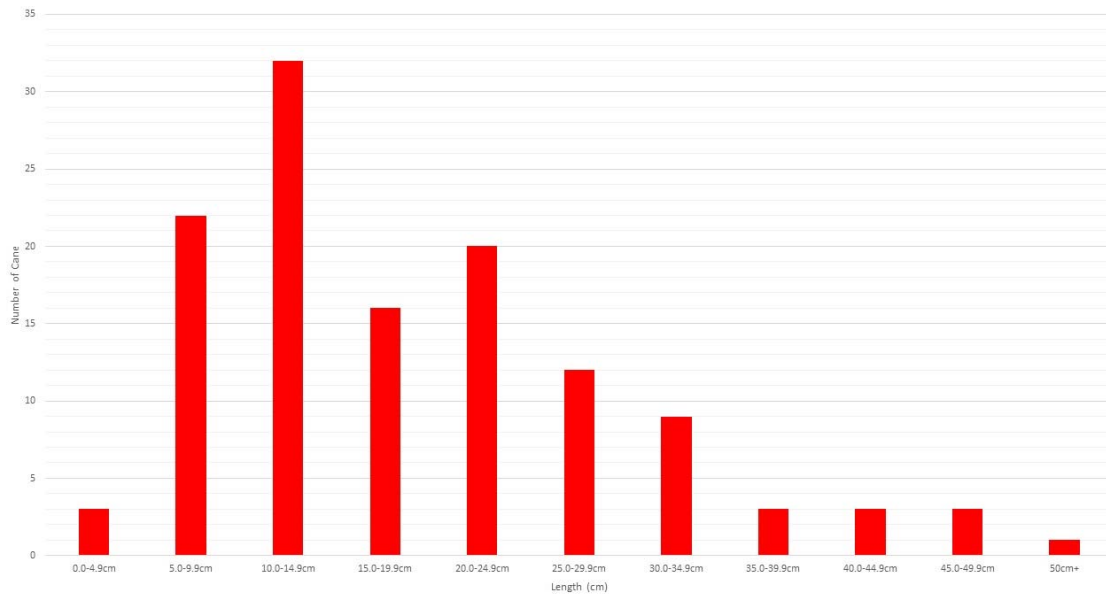


Figure 4. A bar chart to show the length of the cane which is raw material.

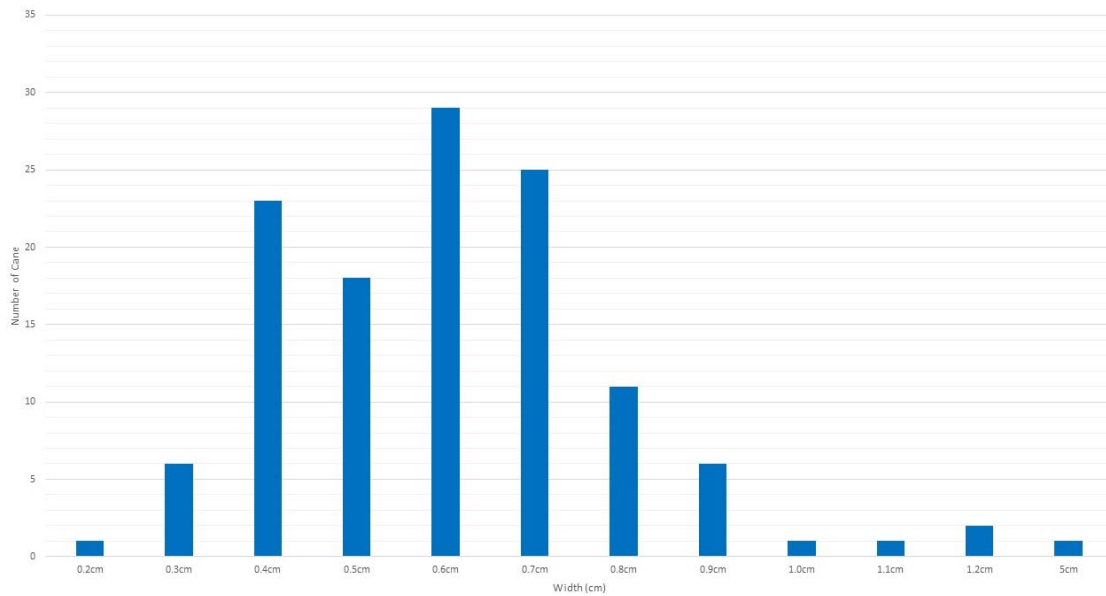


Figure 5. A bar chart to show the length of the cane which is raw material.

Table 1. A table to show the presence of working on the cane.

TYPE OF WORKING	NUMBER OF CANE
Pinched	7
Pinched and Woven	1
No Working	116

Table 2. A table to show the number of different breaks.

TYPE OF BREAK	NUMBER OF CANE
Broken	149
Rough	29
Angular	43
Straight	23
Notched	0

Table 3. A table to show the presence of leaves.

AMOUNT OF LEAVES	NUMBER OF CANE
No Leaves	8
Partial Leaves Present	51
Leaves Present	65

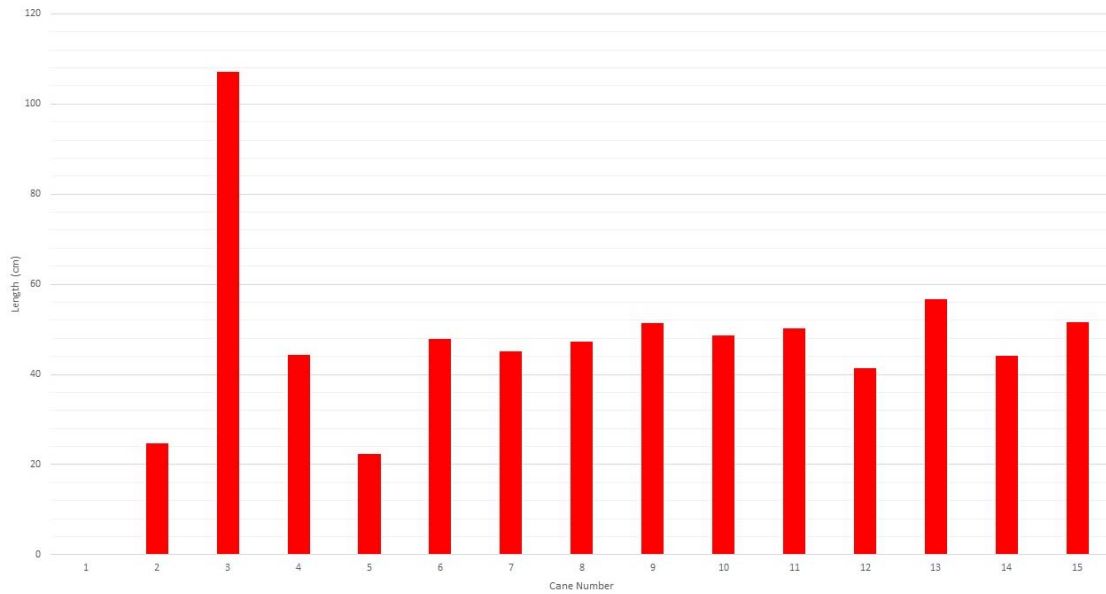


Figure 6. A bar chart to show the length of cane from the cane bundle.

Table 4. A table to show the potential working on cane from the cane bundle.

TYPE OF WORKING	NUMBER OF CANE
Bent Back on Self	5
Associated with Cordage	1
Possible Cut Mark	1
No Working	15

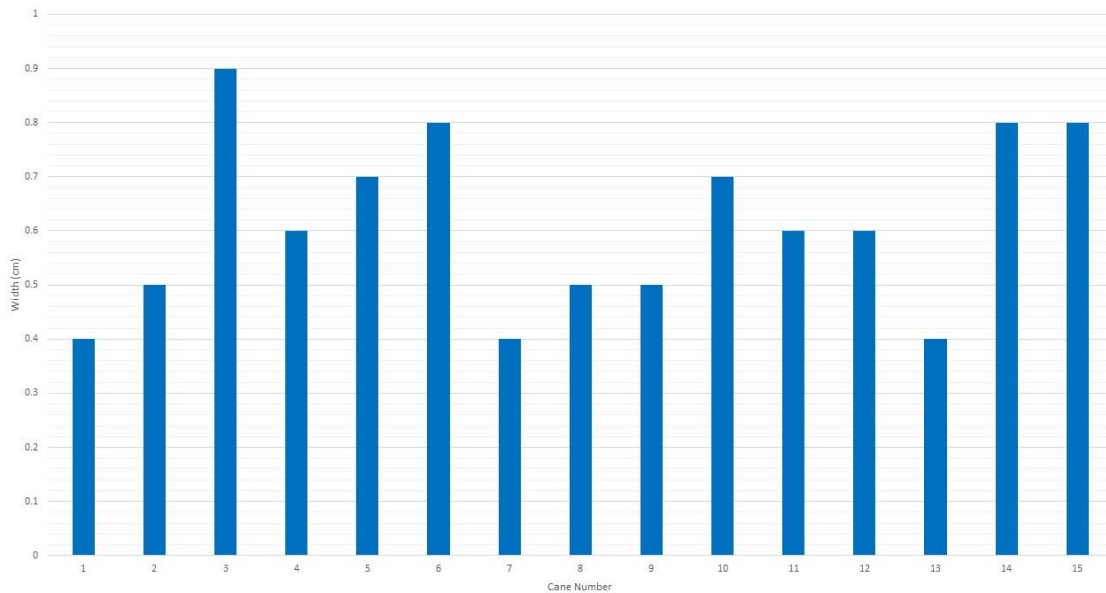


Figure 7. A bar chart to show the width of cane from the cane bundle.

had no evidence of working for the raw material represented 93% of the sample whilst only 53% had no working in the bundle.

Table 5 indicates potential further working. Seven of 30 breaks were notched breaks, which are is not how *carrizo* naturally breaks so is clearly anthropogenic in origin. Indeed, they possibly are related to arrow making (i.e. are the notches to sit on the strings of the bow). Two breaks were straight and 18 were broken. Again, the high number of broken breaks highlights the issue of preservation within Cache Cave.

Table 6 shows that the cane bundle shows a higher rate of the removal of leaves. Eleven pieces of cane had no leaves present and four have partial leaves present. This is significant considering that none of the cane have full leaves present. This suggests that further processing has taken place in the cane bundle.

Next are the cane arrows which are the most developed and processed of all the cane material studied. The results show that the arrows are indeed the most uniformed.

Figure 8 demonstrates that the length of the arrows are more standardise. The arrow length ranges from 36.7 cm and 65.9 cm. Arrow 14 that measures at 36.7 cm is the arrow that was found in cache cave, this arrow is not complete. When the incomplete arrow is removed the length range changes to 57.7 cm to 65.0 cm which shows a more standardised range. This suggests that cane is being cut to a certain length to become arrows: this may be used to help understand the raw material and cane bundle more. Arrow 9 has no length data as it was on display at the museum during data collection and so only observational data was collected.

The width of the arrows shows more variety than length that is not too dissimilar to the cane bundle (Figure 9). The width ranges from 0.7 cm and 1.1 cm. The cane bundle had a range of 0.5 cm and the arrows have range of 0.4 cm whereas if you remove the outlier from the raw material the range is still 1.0 cm. This suggest two things: firstly, that the cane bundle has been processed further; and secondly, that cane width is more varied and possible not as significant as length. Again, Arrow 9 has no data.

Table 7 illustrates the how the arrows have been completely adapted for their use.

The results of the breaks on the cane arrows represent the purely anthropogenically caused breaks made specifically for the arrows (Table 8). The two broken breaks purely represent the cane

Table 5. A table to show the number of different breaks in the cane bundle.

TYPE OF BREAK	NUMBER OF CANE
Broken	18
Rough	0
Angular	0
Straight	2
Notched	7

Table 6. A table to show the presence of leaves in the cane bundle.

AMOUNT OF LEAVES	NUMBER OF CANE
No Leaves	11
Partial Leaves Present	4
Leaves Present	0

Table 7. A table to show the presence of leaves on the arrows

AMOUNT OF LEAVES	NUMBER OF CANE
No Leaves	13
Partial Leaves Present	0
Leaves Present	0

Table 8. A table to show the different breaks on the arrows

TYPE OF BREAK	NUMBER OF CANE
Broken	2
Rough	0
Angular	0
Straight	12
Notched	12

arrow found in Cache Cave which was not complete and reflect a preservation issue. The 12 notch breaks are from the distal end of the arrow where the bow string is placed when it is fired from the bow. The straight breaks is where the wooden fore shaft meets the cane main shaft. Both these breaks are not natural. Interestingly, straight breaks occur in both the raw material and cane bundle. This may indicate that perhaps those straight cuts are also anthropogenic.

The working on the one arrow reflects the fact that the arrow is manufactured. Eleven of the 13 arrows had pigment on them which were green or red (Table 9). The lone arrow from Cave Cache had black marking possibly made from intentional burning. Twelve of the arrows had deer sinew wrapping which is to help attach the fletching and fore shaft. Ten of the arrows have feathers. The arrow in the arrow making kit has wrapping but not feathers or pigment suggesting that it is in the process of being made. This offers further insight into the procedure of making an arrow.

Similar to raw material the capacities of the cane bundle are various, though the results does point towards the cane be processed. The individual properties of the cane as long, straight objects allow bundling into tight groupings: this affords easy transport and storage. The cane bundle may be 'unfurled' to become a kind of mat or screen, or disassembled to enable individual canes to be utilized, perhaps as arrows.

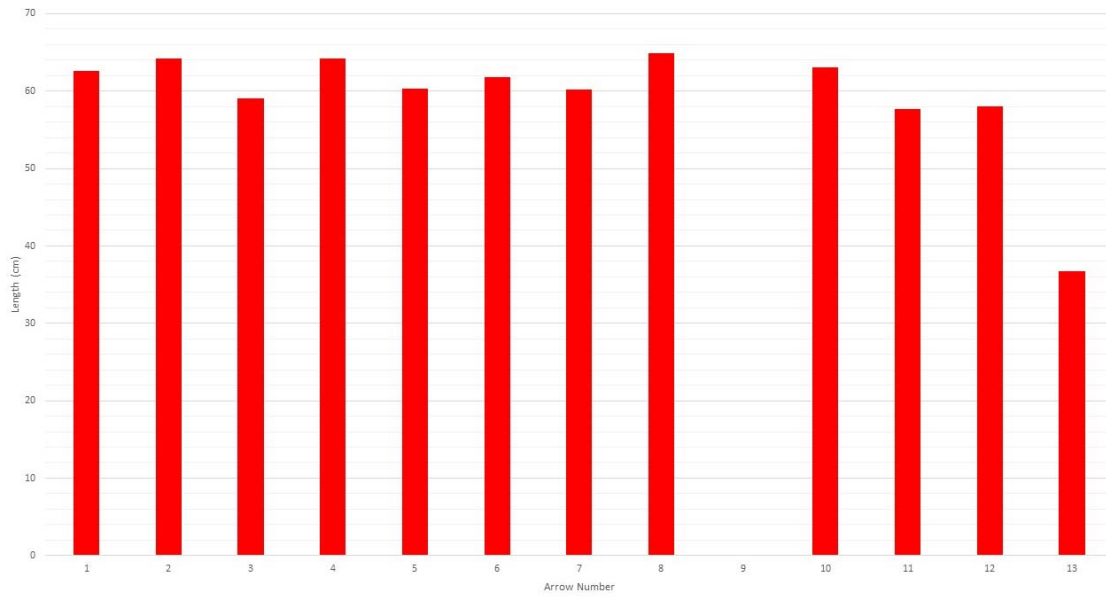


Figure 8. A bar chart to show the length of the arrows.

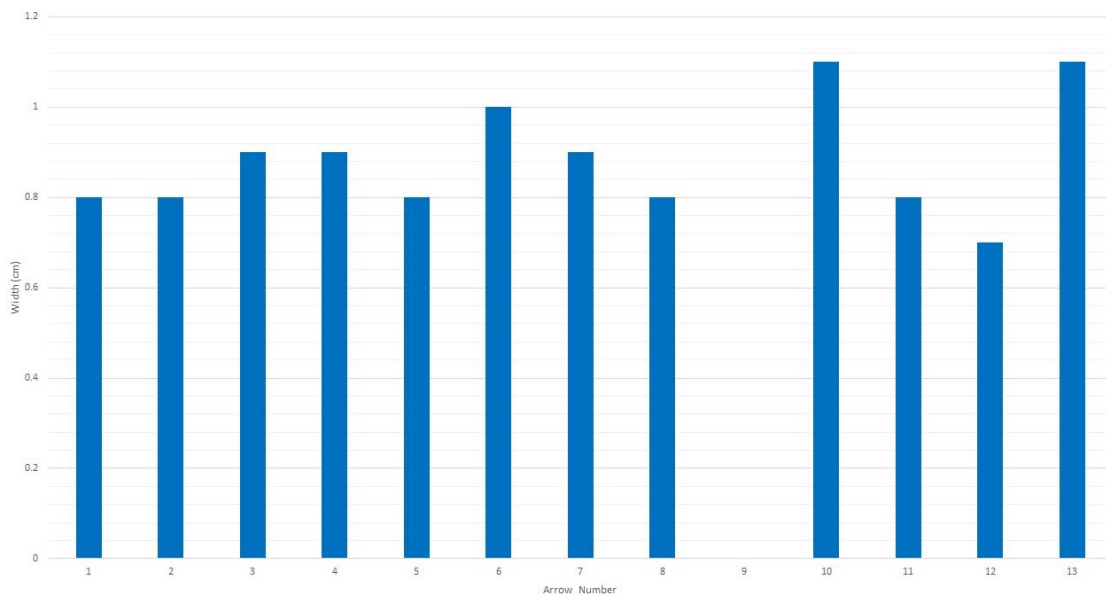


Figure 9. A bar chart to show the width of the arrows.

Table 9. A table to show the different types of working on the arrows.

TYPE OF WORKING	NUMBER OF CANE
Pigment	11
Wrapping	12
Black Marking	1
Feather	10
No Working	0

In comparison, the capacities of the arrows are a lot more obvious. The capacities are to fly, and, in combination of the foreshaft and projectile, to penetrate. Importantly, as a hollow tube, cane is ideal for the inclusion of the foreshaft. It is also possible to assume that there is the capacity to kill both human and animal but this is significant if the capacity of flying and penetrating are actualised. Furthermore, there is an argument to be made that arrows have other uses such as in ceremonies, as forms of display, or for practice.

Stage 4

There are two assemblages that fall into this stage - the hunting assemblage and the arrow making kit. These two assemblages are viewed as being in this stage as they bring together multiple complex assemblages; the bow and arrows of the hunting assemblage, and the feathers, *carrizo*, snake skin, herb bundles, chert flakes, needle drilled shell beads, leather, hafted shark tooth, cordage, a tule mat of the arrow making kit. The interaction of these assemblages determine capacity.

The capacity of the bow and arrow is again to fly and to penetrate; however, with the incorporation of the bow the capacity to kill becomes possible. The capacity of the arrow making kit is to construct arrows which of course then leads on to the capacity to fly, to penetrate and ultimately to kill. However, there are components to the arrow making kit that are not necessarily used to construct arrows so again there may be capacities actualized which are difficult to discern. It may be judicious to consult ethnographic uses of *carrizo* to further consider other capacities.

The results highlight that the data can be divided into are five different sub-categories. The categories are; cane fragments, cane arrows, cane bundle, arrow making kit, and hunting assemblage. The formation of these categories are based upon similar cane being found in the same positions within the model. All five categories are present in the first stage. The results of this stage centres on the imagery from the SEM. On to the second stage, and all five categories are present; however, cane fragments do not extend into subsequent stages. The results in the second stage (i.e. individual properties) focuses on the physical properties as identified from the 3D colour microscope but also from the observations of the cane fragments. The remaining four categories are all seen in the third stage, but the cane arrows and cane bundle do not exceed into Stage 4. The results for Stage 3 looks at the metrical and the observational data for these two categories. Finally, the arrow making kit and hunting assemblage falls into the fourth stage. A summary of the stages is presented below, the bold reflects when a category reaches its final stage:

Stage 1: Cane fragments, cane arrows, cane bundle, Halford arrow making kit, and Mr Manke's hunting assemblage.

Stage 2: **Cane fragments**, cane arrows, cane bundle, Halford arrow making kit, and Mr Manke's hunting assemblage.

Stage 3: **Cane arrows, cane bundle**, Halford arrow making kit, and Mr Manke's hunting assemblage

Stage 4: **Halford arrow making kit, Mr Manke's hunting assemblage.**

DISCUSSION

The results of the proposed model may offer an insight to why *carrizo* cane was present at Cache Cave and what the overall purpose of the site was. One of the outcomes of the model is that it allows for a potential Chaine Opératoire to be established. The *carrizo* cane will have been harvested. At the point of collection preliminary processing would begin; some leaf stripping would occur. The ethnographic record would then suggest they were tied into bundles during transportation. However, the results suggests that the raw unprocessed cane would be stored within the cave but with little evidence they were in bundles. Then, the cane would start to be processed; cane of more similar length would be collected and more leaves would be removed. Potentially, the working and notched breaks suggest that some cane that had once already been utilised and discarded would be recycled back into processed material. All of this processed material would then be placed into a bundle, or cached in a crevice ready for future use. At the same time individuals would also be collecting and storing other

materials that were needed. In the case of arrow production possible evidence includes over 56 feathers, 624 pieces of asphaltum, 494 pieces of cordage and 43 wooden sticks plus two hardwood foreshafts which have so far been found on the site. Of course, these materials have their own capacities which allowed them to be used for manufacturing other composite artefacts, so it is not clear how much it relates to arrow making.

Next, looking at the cane use within the caves also adds to the current idea of the overall site use. The current argument is centred on two ideas; first, that the material was cached within the cave due to a demographic rebound following the Medieval Climatic Anomaly; and second, that Cave 2 had use as both a cache locale and a production site. The results of the capacity analysis as discussed above indicates that *carrizo* cane was being harvested and probably processed for storage in Cave 2. Confirmation comes from preliminary lithic analysis which suggests that nine of 17 lithics were used to scrape a harder substance could well have been the *carrizo* (Hill 2016). This would not only suggest that *carrizo* was actively being processed in Cave 2 but genuine manufacturing at least in a small scale may have also been happening. Furthermore, dating results so far suggest that the *carrizo* was harvested predominately after the Medieval Climatic Anomaly. This supports the hypothesis that caching and production which included curation, preparation, and storage of cane material increased significantly after the MCA and that the Chumash may have been doing this as part of wider storage practices developed during that difficult period. In this light, perhaps such practices were preparation in case of further droughts. But it does seem that this was related to human population increased when the ecosystem rebounded after the MCA. This supports arguments such as that put forward by Pauketat (2008:56) that the environment and human agency together can be used to explain changes in the archaeological record. However, the material agency of the *carrizo* in terms of its capacity is that which helped enabled the human ability to reinvest within the local landscape because *carrizo* was a robust, but likely widely available resource. This is significant in the context of the MCA as *carrizo* itself requires good water sources to survive and flourish (Takashi et al. 2005). In light of Bettinger's (2015) hypothesis that the introduction of the bow and arrow went hand-in-hand with small seed food exploitation and the intensive perishable technologies, the timing of the abundance of *carrizo* cane in Cache Cave is telling. He argues that environmental change was not the prime cause for the development of Californian society at the time of European contact, but technological change especially seen in the bow-and-arrow. Does the collection, processing, and storage of potential arrow material simply reflect the introduction of this new technology regardless of the MCA? Or, were the MCA and the introduction of the bow-and-arrow both causally related factors in the accumulation of *carrizo* seen at Cache Cave? Future research will move towards addressing this question.

This insight into use and purpose of *carrizo* cane and the overall interpretation of Cache Cave may have wider implications for understanding Chumash society. First, the fact the *carrizo* cane is found in such abundance in the cave highlights the local relationship and understanding of the landscape. This is amplified knowing that the cane found archaeologically is only the remnants of what was not used or taken away; the amount actually used would have been much higher. Furthermore, there is an argument to be made that there has to be a level of organisation to Cache Cave. The volume of material within the caves indicates that a fairly large population utilised the caves; the site appears to be more important than just one extended family group's storage place (Robinson 2012). It may have served a population of the order of a village or tribelet, and thus of central importance within the local socio-political landscape. Moreover, the procurement of desired material and resources may also have been a factor within identity formation while being a means to obtain social standing within society. The collection and storing of raw material which eventually turns into elaborate composite artefacts means that this material certainly had a degree of value. That some of that material ends up as arrows, which themselves can sometimes be decorated such as the Cache Cave example, can be interpreted as forming or reinforcing the identity of the person as a hunter in the process. With the introduction of the bow-and-arrow, it is probable that an individual's standing as a skilled and effective hunter increasingly became a desirable status to hold. It could therefore be argued that individuals were hoarding valuable material culture as a means to supply the necessary components to sustain this kind of identity formation.

One of the main issues with using capacity as a means to understand agency and affect is that ultimately capacity can be limitless. DeLanda (2012:13) suggests that “capacities are potentially infinite in number because they depend not only on the power of an entity to affect but also on that of innumerable other entities to be affected by it.” Ultimately, this means that the researcher has to make the decision as to which capacities are of interest and to be investigated. To do this, Robinson (2017) uses theoretical approaches to value to ask particular questions of capacity (see also Robinson and Wienhold 2016 for another approach). This narrows the potential capacities of the cached assemblage by acknowledging how society valued such materials. In this paper, the first phase of the Multi-scale Capacity Analysis Model reduces the capacity to purely what the plant naturally will become. It would have been possible to look at the molecular rather than cellular level as the starting point, but this was judged to be a scale not needed for this study. When looking at the compound arrows, the capacities are also reduced as the assemblage is more defined. However, when the assemblage is less defined or is obviously going to change the capacity becomes a lot more difficult to establish. Another way is to turn to other ethnographic sources to determine the next potential stage for the assemblage. The combination of the Multi-scale Capacity Analysis Model breaking down the assemblage, the ethnographic informing the potential of the assemblage, and context in which it is found will reduce the potential capacity.

Part of the proposal of using *carrizo* cane as a case study for the proposed model was to develop the model further based upon the outcomes. It is clear from the results that the model has the real potential to help aid the interpretation of archaeological sites and past societies. However, the study has also highlighted some issues and the need to develop the model further. One of the apparent issues is that the model should be divided into two distinct phases both with different stages which might be termed the Natural State, and the Altered State. The Natural State represents the capacity of *carrizo* cane as a raw material before consider it in relation to external components. This phase encompasses stages Fundamental Structure and Individual Properties of the original model. However, the Individual Properties stage raised further issues. The main problem with the original format of the stage is that it was too broad by including both the physical properties of the cane and the untouched raw material.

In this modified scheme, there is a clear distinction between the two phases. The point of change is when there is an influence from an external component. Though the external component includes humans it may be other ‘non-*carrizo*’ components. Because of this, the external force can be natural, such as animal activity or a natural processes, such as weathering or soil movement. For *carrizo* the natural capacity is essentially just to be *carrizo*; to grow, bend, and be strong. Using this case study the external force could be the Chumash collecting the cane or it could be a strong current in the water removing the cane.

The second phase, Altered State, concentrations on the capacity of the component once it has been removed from its natural state or has been changed. This includes Stage Three and Stage Four of the original model; Collective Properties, and Wider Collective Properties. In the adapted model these will be Stage Four and Stage Five with the same definitions as before; Wider Collective Properties could still be multiple stages dependant on scale. Instead, a new Stage Three is being proposed to incorporate raw material; Non-natural Properties. The stage is defined as “to look at the physical properties of a single or a group of the same components immediately after it has been removed from its natural state to establish capacity.” This stage is extremely important as it marks the biggest change in capacity; natural to unnatural. In the instance where the external force is human orientated it marks the shift capacity being purely deterministic (natural) to an element of cognition. The capacity is driven by human intent, what an individual wants the material to be, and is reflective of what is comprehended. Figure 10 below illustrates the new model centred on the changes discussed above; note the grey indicates the point of external interference.

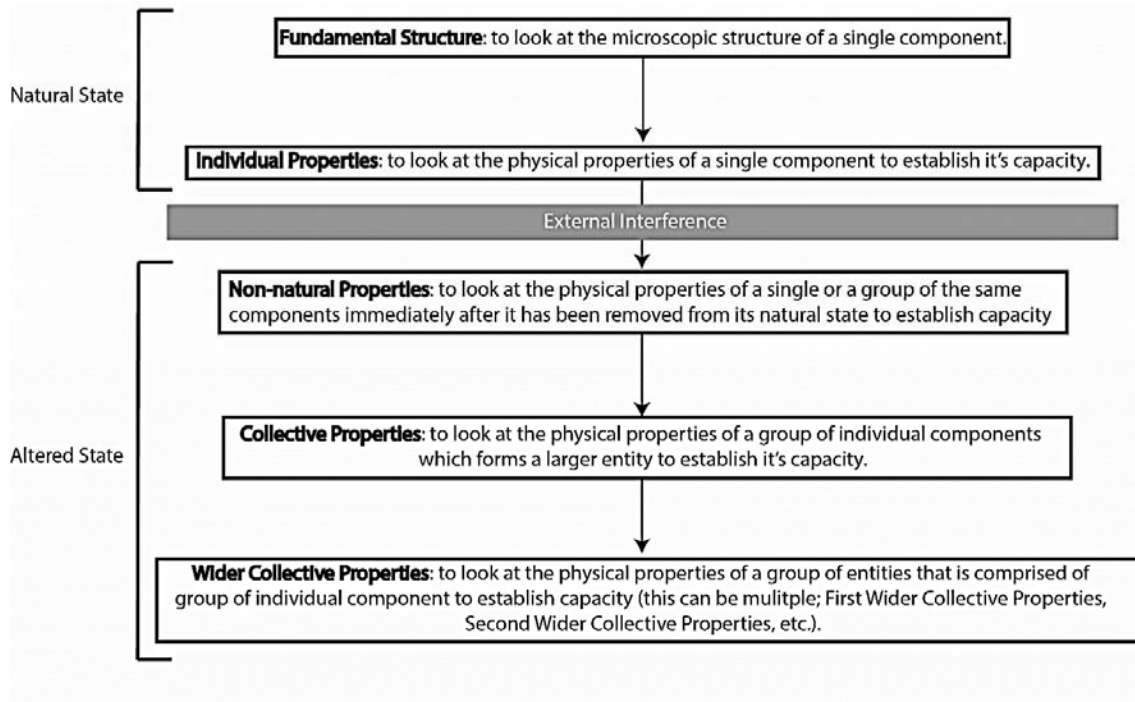


Figure 10. A schematic to show the adapted proposed model based on the findings of this study.

CONCLUSION

In conclusion, this paper demonstrates the potential use of Assemblage Theory for archaeology centred around a capacity analysis based on a multi-scale perspective. Using this approach will allow archaeologists to look at the archaeological record to understand both the use and purpose of material culture and as an aid to interpret site use. By using the model an approach to the material culture within Cache Cave was put forward allowing for interpretations of what typically is an overlooked artefact or even 'ecofact'. Determining the capacity of *carrizo* has led to further supporting the argument that as the environment changes, so does the Chumash with their caching, manufacturing, technological, and storage practices. However, it could be argued that many of the same conclusions could have been achieved using other theoretical or methodological approaches. Ultimately, it is still early days for evaluating Assemblage Theory and its role for archaeologists. The prevalence of Assemblage Theory across so many disciplines shows that it will continue to be important for the foreseeable future. Much more work is needed to pursue how well it serves a role in advancing archaeological interpretation. On the other hand, adopting Assemblage Theory promotes viewing the archaeological record from a different perspective which includes considering the material making up artefacts as biographical objects with agentive trajectories preceding human involvement, before making a careful consideration of the role and value of those materials within the construction of human identity. In a very straightforward manner, this study shows how non-human entities (in this case, *carrizo*) do play a role in a society's development.

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