Social Transmission: Oldowan Freehand Knapping

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Results:

- Only one chain throughout the whole experiment failed, the fourth chain for reverse engineering.
- Could mean that our qualifications for a successful chain were too broad.
- Mean number of strikes was highest for observation and reverse engineering, being 39 and 31.67 respectively.
- Mean time to success for observation and reverse engineering was 87.25 and 199.3 seconds respectively.
- Gestural and verbal transmission did better.
  - Gestural did slightly better than verbal. Their mean number of strikes was the same, 12, but the median for gestural was 3 while verbal was 5.
  - The mean time to success was lower for gestural as well at 56.8 compared to verbal at 81 seconds.
- An explanation could be just like Putt et al, where over imitation was an explanation for why their nonverbal group did better than their verbal one. (Putt et al, 2014)
- Could also mean that we the researchers made mistakes. We pointed out when a flake was made, we never showed them how to cut the carrot, only told them.
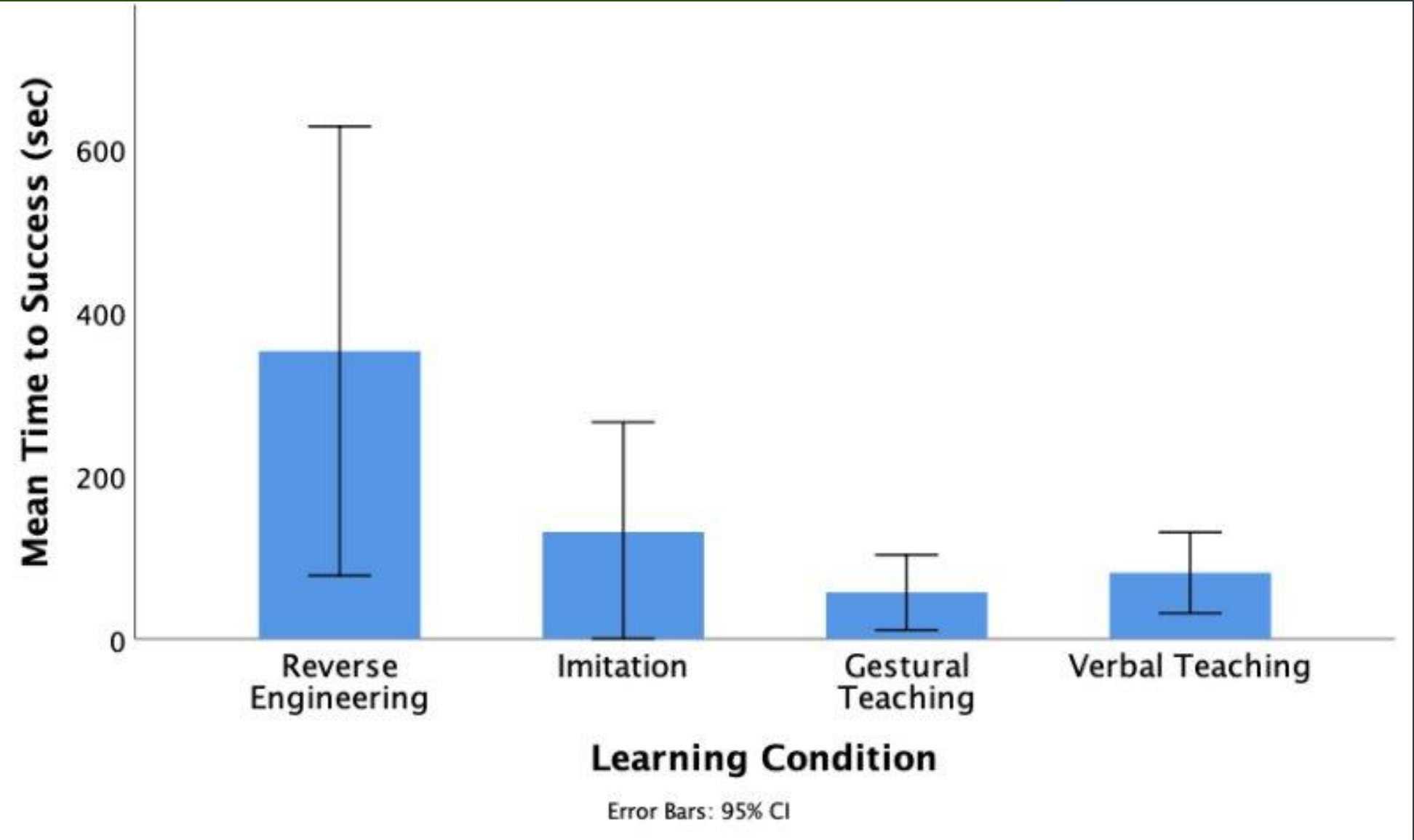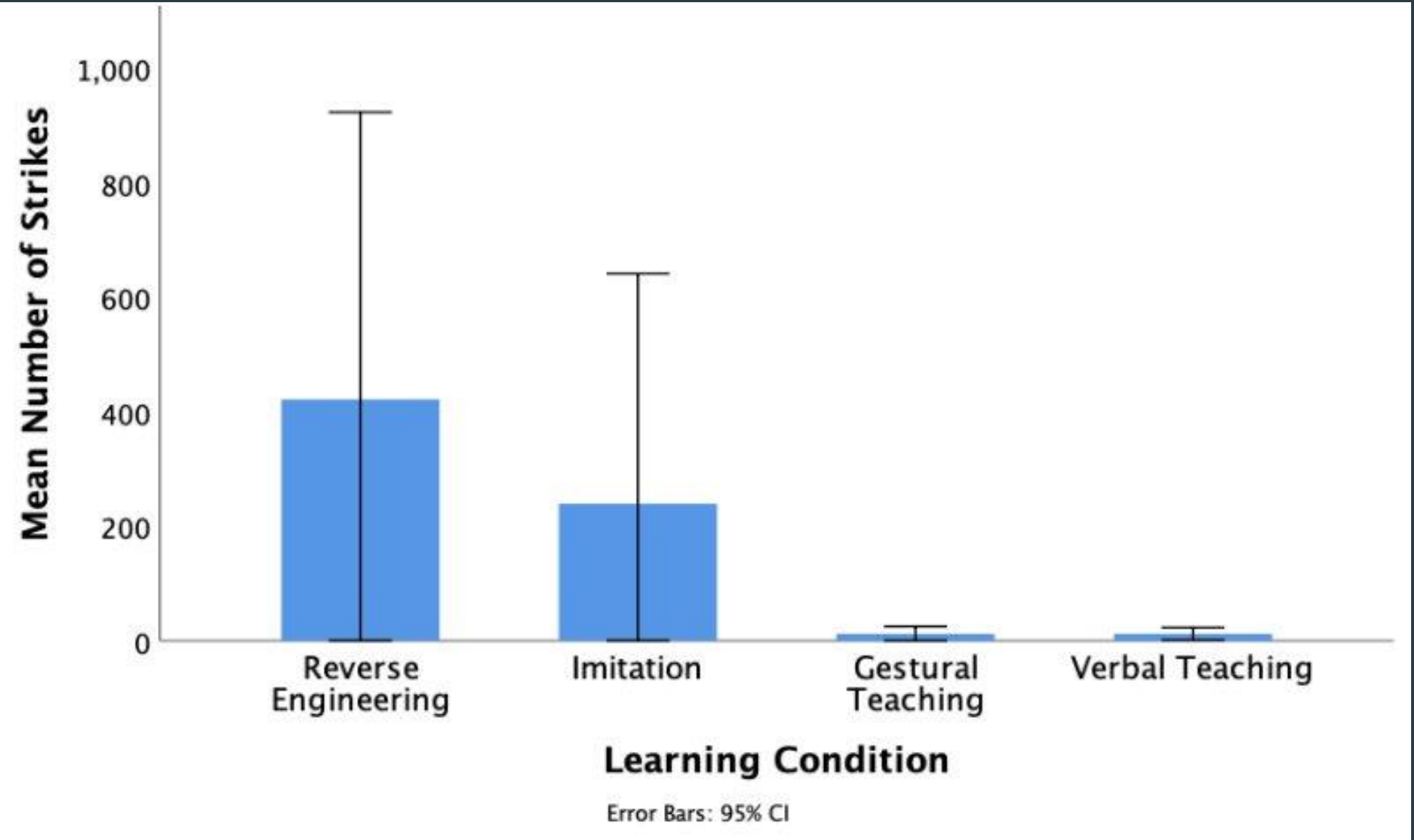

Figure 1

Figure 2

Figure 1: Mean number seconds
Figure 2: Mean number of strikes
Figure 3: Flake knapping diagram, (Shea, 2017)

Introduction:

- Our experiment is a replication of the one done by Dr. Morgan and his colleagues in order to study which type of social transmission was the best in terms of teaching Oldowan technocomplex freehand knapping. They were seeking to test their theory that there is a co-evolutionary relationship between language and stone tool creation. (Morgan et al, 2015). We had 20 subjects learn knapping and attempt to spread their knowledge to another, except for reverse engineering they just had the finished tools. We sought to test our hypothesis that verbal teaching would create the longest, most efficient chains. Our usability test would evaluate whether a flake could be used in a realistic setting and determine if the chain was successful.

Abstract:

- We conducted an experiment to see out of four types of social transmission, which one created the longest and most efficient chains.
- The social transmission types were; verbal, observation, gestural, and reverse engineering.
- A researcher would begin the chain, with a subject being taught by them, then that subject would go on to teach another, and so on until the chain failed.
- We tested the success of each flake created through the subject's freehand knapping a using a usability test where the subject attempted to cut a carrot using the tool they created
- We hypothesized that verbal would have the longest chain, followed by gestural, observation, and reverse engineering.
- Analysis revealed that gestural and verbal did do better than the other two transmission types, our hypothesis that verbal was the best was proven wrong by the data.
- Gestural and verbal transmission were very close, but gestural had less strikes and less time than verbal had.
- Results would suggest that any form of active teaching is better than none, but verbal teaching may not be necessary.

Methods:

- Participants: College students aged 18 and older. Randomly selected for any of the four transmission types.
- Beginning: Researcher begins the chain by teaching the task to the subject. Or in the case of reverse engineering; a core, flake, hammerstone, and cut carrot are set out for them to examine.
- Data Collection: Video was recorded of the process of one individual, whether a researcher or subject, teaching knapping, letting them see them knap, or the subject observing the materials. Also, a researcher made notes on the number of strikes and time to success.
- Materials:
  - Chert cores, hammerstones, flakes, tarps, safety gear, laptop for recording, paper and pencil for data recording.

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Discussion:

- There are many caveats to our results.
  - Researchers are novices at running experiments, their inexperience led them to talking to subjects when they should not have. Such as telling them a flake came off, or that they need to cut the carrot instead of miming it.
  - Beginning of the verbal chain, researchers made a safety mistake by testing flake sharpness by gently pressing it to the arm and said to subjects they could do the same.
- Results show that inactive teaching is not as effective as active teaching. However, just like Dr. Putt and her colleagues' experiment, we found that nonverbal gestural teaching did slightly better than verbal. But as previously stated, there are some caveats to this outcome, since Morgan and his colleagues got verbal being the best transmission type as their outcome. (Morgan et al, 2015), (Putt et al, 2014). So there is likely more at play, such as:
  - Time: We may have had each link be too long.
  - Chain length: Not enough chains to accurately reflect real social transmission, all but one link were successful.
  - Usability test: May have been too simple and easy, with tools the size of dimes being able to cut it.
  - Cores: The beginning of the experiment, subjects had trouble with the specific cores we had but as we switched to other cores the flakes went from small to large. And made many more cores.

Conclusion: Results indicate that a more active type of social transmission may be better than inactive ones, i.e. observation and reverse engineering, our hypothesis that verbal teaching would be the best was disproven. Like previously stated there are caveats and issues with the experiment itself. But there is evidence and data that can be used to make a new hypothesis. This experiment's outcome does align with Putt and her colleagues' experiment's outcome, while not exactly aligning with Morgan and his colleagues'. I would say that this would coincide with the idea that Australopithecus and Paranthropus were capable of knapping and would probably teach it in a way more complex than modern nonhuman great apes would. (Shea, 2017). Gestural communication would likely be the most complex form of language and social transmission that these prehuman hominids would have access to. Therefore, it would stand to reason that it may be the better form of social transmission, however much of a small difference it may make, than verbal transmission.

Gestural Language/transmission:
- Would be a precursor to verbal language. Likely used by hominids existing before homo. Would be the groundwork for verbal language, with many gestures already having meaning before verbal utterances became more common. (Corballis, 1999). Great apes being able to learn sign language, like Koko, may show that gestural language and social transmission are "evolutionarily ancient facilities" for learning gesture speech. (Corballis, 1999).
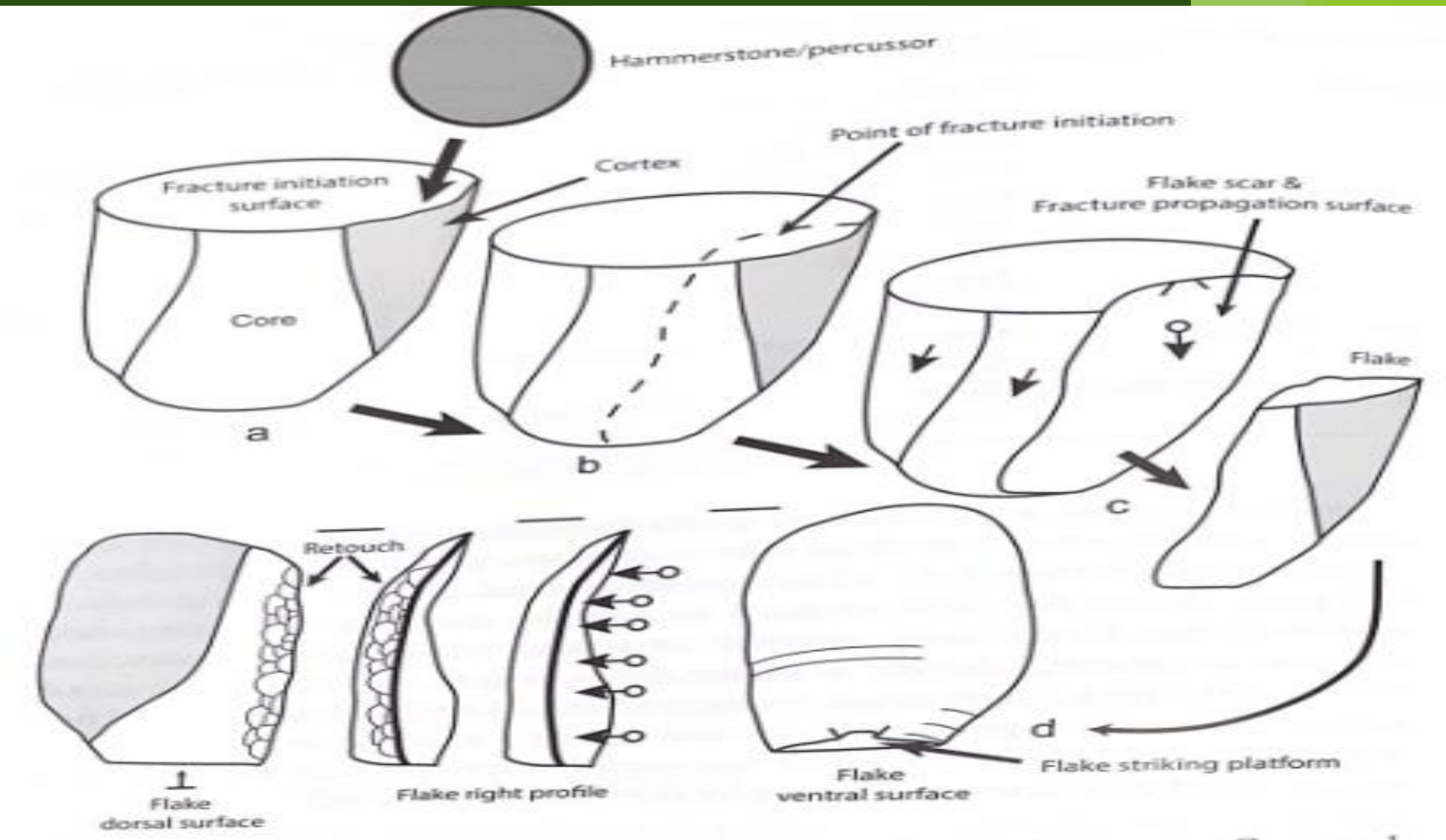

Figure 3