

**PhD thesis review report for Zsafia Csajbok's thesis titled:
Mate preferences and their integration to mate choice**

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This is an impressive PhD thesis. It includes four papers, three of which have already been published, while the fourth is under review. Each of these are substantial and important contributions to the science of mate choice in humans. The introduction excellently covered the concepts of mate preference and mate value, which is a difficult task as both are elusive intellectual instruments: the closer one goes the fuzzier is the image. The introduction also includes a useful methodological discussion about the most adequate mate choice models.

The concept and implied attributes of “romantic relationship”

Perhaps the most important axiom behind the thesis is the existence of the phenomenon “romantic relationship”: a social network edge in which the behavioural dynamics is driven overwhelmingly by inherited reproductive psychology. The assumption that this edge is a type, and can be delineated from other edge types is essential to discuss any of the results in the thesis. Without the romantic relationship concept, neither mate choice preferences, nor mate choice valuation make much sense.

A perhaps more interesting assumption that is implied by the use of the term, by the experimental designs, and the discussion of the empirical results is that romantic relationships are mostly monogamous and exclusive. This has been certainly the patriarchal image projected on human sexuality and reproduction for the past couple of millennia in most parts of the planet. However, whether we think that our species is 350k old or 800k old, the patriarchal social organisation corresponds to less than 98% of our species' history. It is tempting to employ a durkheimian social constructivist approach as an answer to this problem, but that way out would have two consequences: one theoretical and one practical snag.

The theoretical issue is that by subscribing to a phenomenon that at best existed only for max 2% of our species' history, forced onto human populations using strong, culturally-prescribed controls (and even then it worked in words only most of the time), we would be losing out on exactly the evolutionary foundations that we claim to be able to use for deeper scientific insight.

The practical issue is that as the traditional patriarchal regulatory systems of sexuality and romantic relationships weaken, our species is returning to some sort of baseline, a process that perhaps started 150-200 years ago, and is ongoing today. Gender equal societies, whether in hunter-gatherers or Scandinavians, are characterised by an overwhelmingly female control of the reproductive decisions, and the relaxation of both the life-time monogamy and the here-and-now exclusivity assumptions.

The consequence is that people have multiple-parallel romantic relationships that vary not only along the time-horizon line, but along a host of other factors, as well. This complication introduces a kaleidoscope of relationship types in which mate choice is likely to play along a

different dynamic compared to the life-long, one-shot choice problem in the case of exclusive monogamy.

As the thesis' introduction points out, romantic relationships can and do take many forms. They can be indeed one-night stands, or a marriage as prescribed by the patriarchal norms.

But what happens to fuckbuddies? Highly sexual relationships that are essentially a sequence of one-night stands, except with the same person. Can one "scratch an itch" with the same human, truly without an emotional bond emerging, thrusting the concept of the mind's free will into the judeo-christian-delineated body? How do mate choice preferences play out in this type of relationship? Are we implying that one does not have a preference for a fuckbuddy, just ends up with one? And what is the frontier between a fuckbody and friend? Does the behavioural phenomenon of fuckbuddy relationships question the axiom of a romantic relationship?

What happens to emotionally passionate, but non-sexual love that lasts a lifetime, maybe parallel to a host of stormy sexualised relationships on both sides? If we agree that the definition of romantic relationship does not necessarily need to imply the involvement of the genitals, do we think that these relationships are essentially marriages deprived of sexual pleasures, even if not of sensuality? And does one have mate choice preferences for such an unconsummated love-of-life?

How about a childhood sweetheart one revisits annually, with intensive sexual and emotional presence in those increasingly ritualised red letter days, but with no interaction at any other time. The rest of the year, everyone is tending their families, and other partners. What is the concept of mate choice preference in this case?

Of course, this criticism is not fair. As the thesis did point out this issue. Still, the framing of the mate preference concept in all of these empirical designs was essentially moving along the short-long term dimension. It is not always clear whether a phenomenon picked up is due to a new behaviour within the monogamous and exclusive framing, or is simply part of a different relationship type.

As we are moving towards gender equality, arguably the natural human behaviour in the wild, and thus returning to the human baseline, the patriarchal rules around romantic relationships weaken. The latin american sexist joke about morning in the church with family, and evening in the brothel with the buddies, a cultural example of dichotomisation of the mate choice problem along time horizon, gives way to the polyamorous relationship arsenal, in which emotions, gender, sex, temporal and spacial proximity, can and do vary both among social network edges, but also within the edges as life-time passes.

Perhaps many of the mate choice preferences, so brilliantly discussed in this thesis, we will look back to in the future, and we might find that we will need to re-define them against a set of more slippery, interacting variables, and re-allocate them to a much larger toolbox of social relationships. We might realise that we will have moved away from the chimpanzee-like trichotomy of sex vs. family vs. alliance towards a more bonobo-like social world in which sex, and the corresponding emotions that we may romanticise into the term romantic, acts more like play. In fact, sex in humans is similar to play behaviour, just like in

bonobos. Should we merge the romantic and adult play relationship concepts into one? How would this change the choice problem? Would that be more adequate framing for post-patriarchal social organisation in humans?

Social network considerations

A second point concerns the social network structure around which the relationship formation takes place. The relationship definition we use tends to assume that it takes place between two people. A couple is a couple, an edge is an edge.

However, this is not even the case for monogamous relationships. For instance, the social network compatibility between the two parties is one of the mate choice factors, and is subject to manipulation (by the parents, for instance). In this case, the concept of mate choice preference, while still dyadic, i.e., referring to a possible future pair, is that of several people.

But then the relationship type question muddies the water again. Would Julia have ended up tangled up with the convoluted tragedy if Romeo was merely a one-night stand? Long-term relationships create stable social bonds that can hold together entire subnetworks, and make collective action projects that go beyond the scale of the bedroom, possible. Apple trees do not discuss with their mum who they should pollinate with, but we do.

While present in the monogamous patriarchal relationship concept, the social network complexities of polyamory raises a network management problem explicitly. When the patriarchal rules vane, romantic attachment and sex become similar to who plays with whom, who has coffee with whom, who collaborates with whom. Love, sex, romantic attachment, when happening with several people at the same time, creates a love graph, in which the local network structure becomes important. Just like in a scientific collaborations, we do not collaborate in one-on-ones, but rather we exist in a particularly structured social network of actions and contributions, in a polyamorous social universe, the structure of a many edges interacts with our preferences that play out in the dyadic, edge-level behaviour.

Unfortunately, this love network structure point brings further complications to the question of what mating is, and what preferences are. If one exists in a romantic network of, for instance, 5 people, in which every one person has some form of sexual relationship with 3 others, then the relationship dynamics in any one edge is likely to be affected by the dynamics of all the edges. This suggests that the dyadic preferences, let alone the factor space in which the preferences become manifested, are likely to be dependent on both the other edges, and the structure of the edges.

People living in such, at the same time archaic and futuristic, arrangements will still make choices, and these choices will not be entirely random, and thus along some variables, some of which will be the products of evolution, and thus inherited. These variables will have an optimal point, which can serve as a "preference". But the network-regarding optimisation of these might become more like the game Go, rather than a sprint race where the fastest wins. The science of mate preference and choice is likely to become more complicated.

Which elements of the on-market human behaviour are due to the fact that we live in large, dense, and mostly urban populations? What search and choice behaviour do we expect in a forager population, i.e., in the natural social habitat of this community-living ape?

How does the social organisation, in particular the patriarchal rules around sex and marriage, impact the search and choice problems? For instance, what are the differences between a partible paternity system of a foraging culture in Paraguay, and the devout catholic downtown of Asuncion, or between a polyamorous community in San Francisco and the super-conservative rural north-east California?

Is the valuation process different between primary and secondary partners? Is there a difference between the two sexes in that? How does non-binary sexuality affect not only the focus individual's objective function, but also the choice problem when the potential partners' sexuality is non-binary, and possibly not even constant?

Mate market and valuations

The shift away from the patriarchally prescribed relationship types, has limited impact on the mate value concept. For whatever the variables are, wherever their optimal points are, and thus whatever the preferences are, as long as these are, at least relatively, stable, and as long as there is a large number of people who are engaging in the search for romantic partners, the intellectual tools of a market model, and thus the concept of the mate value, can still be useful, and non-controversial.

However, like with all market valuations, the value is determined by the supply and demand, rather than being inherent in the products themselves. Thus operating with the concept of mate value without the assessment of the demand and the competing supply, should not be done. The art market, a model perhaps closer to the human mate market (rather than of used cars) offers an illustration: a banana taped onto a wall has no inherent value. It is the demand for wall-taped bananas, and the supply of such bananas that determine what price one is willing to pay. (Unless, of course, we fall into infatuation with one particular banana stuck on the wall, at which point, the market concept falls away, and we are desperate and ready to pay the infinite.) The point is that the use of market mechanics could be done by employing the available, and very well defined models in economics.

Mathematical nature of the models

Dealbreakers. A small side point about thresholds. While the non-linear mapping from the variable values to the valuation is likely in the case of most variables, using the threshold concept implies two assumptions. The first, implied in the current use of the threshold concept, is that the value becomes zero (in single dimension models) or negative infinity (for multidimensional models) for at least some region of the variable. However, there is another assumption as well, less discussed: that the mapping between the variable and the objective function is discontinuous. Albeit in practical measurements this additional assumption might be of little relevance, it might be worth thinking through why such an absolute division line would be there to start with. Is there a reason why such a discontinuity would exist? And if it

does, does that have any practical relevance, either for measurement, or for the mate choice problem? Are these mapping function discontinuities dependent on the market conditions, or on the network structure around including mating, friendship, and family overall network structure in the immediate network neighbourhood?

Evolutionary foundations of the functional forms. The comparison of the factor models in the thesis is purely empirical: the evolutionary foundations are present as a theoretical framework, rather than directly offering top-down predictive models. Would it be possible to infer the functional form from evolutionary theory of reproduction?

For instance, is assortative mating simply a behavioural rule-of-thumb, i.e., an enacted proxy variable, towards the underlying need for parental compatibility? If so, should assortative mating be regarded simply as one of the choice factors (and related to other parental compatibility cues, for instance, culture-dependent pair-dance), rather than an overall functional form/mate choice model?

Formal language. I suggest that future discussions about variables, interdependence, mapping, and functional form of the objective function is done using a formal language. Both biology, including at least some parts of evolutionary behavioural science focusing on humans, as well as the economics of market behaviour focusing on other products than sex and romantic companionship, provide readily available frameworks for formal analytics. The use of the mathematical language could, perhaps, at the same time simplify the discussion, as well as provide additional paths towards understanding the structure of the phenomenon we are aiming to describe.

These questions notwithstanding, the thesis of Zsafia Csajbok is an excellent work, and definitely merits to be passed, and I look forward to learning from her scientific work in the future.