How Harmony is Maintained in an Institute Despite Low Number of Females

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Background: In a system where there are fewer resources and more demand, there naturally would be aggression amongst the resource seekers for the resource. In the previous Aurora, I tried to play a technical cupid, matching males with females. This Aurora I realize that there may be exceedingly large number of males to try on females which by no doubt are scarce resources (non-reusable as assumed in the article, big assumption though) within the institute. Failed attempts may lead to un-socialistic behaviour (examples suppressed) which means this need to be curtailed for harmonious living. In this article I show how the number of failed attempts is guaranteed to be low despite a small female to male ratio. Readers not familiar with set theory or logic programming may skip the mathematical parts of the article and believe the author's conclusions were results of some heavy computation.

Modelling and assumptions: Let total number of males at time 't' be M(t) and total number of females be F(t). Non-males are not considered in the study. Let committed males be comM(t) ($comM(t) \subseteq M(t)$) and committed females be comF(t) ($comF(t) \subseteq F(t)$). Hence at any time there are a total of M(t) – comM(t) males available to try on F(t) - comF(t) females. Let the desirous men be desM(t) ($desM(t) \subseteq M(t) - comM(t)$). Some males may have high expectations and may not participate, some may be interested in other stuff and may hence not participate, some may be in social circle where participation is not possible, etc.

We assume all pairings are done at a definite time of the year (say Valentine's Day). To the best of my knowledge Aurora always follows Valentine's Day. So new couples formed at the Valentine's Day can be easily be observed at Aurora, which many people have been doing since long. We further assume that every female rates the males on the same factors and every male rates the females on the same factors. Hence if two females are to rank men, the rankings would be similar. Similar is the case for males. Broadly this is a valid assumption leaving some characteristic males and females who do not necessarily participate in the process.

Let the utility perceived by a male 'm' of himself be P(m) and let the actual utility as rated by a female be V(m). Since the assumption is that pairing is done at a definite time, every desirous male 'm' ($m \in desM(t)$) may select a single female f ($f \in F(t) - comF(t)$) to try upon. Since the set desM(t) and corresponding member's actual utility is unknown by 'm', there is no way to predict best female to try upon such that chances of acceptance are high. For a practical understanding recall the discussions just after a new batch arrives.

Now every desirous female selects the best male, if the actual utility of best male is above her expectation level (say E(f)). Hence for a female 'f' (f ∈ F(t) – comF(t)) let Q(f) be the queue of males who tried upon 'f' (Q(f)∈desM(t)). Q(f) pictorially represents the queue of males standing outside the female's house as depicted in numerous cartoons. Mathematically $\bigcup_f Q(f) = des_M(t)$ and $Q(f_1) \cap Q(f_2) = \phi \forall f_1 \neq f_2$ and . Pairings (m,f) of a male m and female f done at the time t are given by equation (1).

$$Pairing = \bigcup ((m,f): V(m) \geq V(m_i) \forall m \neq m_i, m, m_i \in Q(f), V(m) \geq E(f)) \forall f \in F(t) - com_F(t) \quad (1)$$

Objective: The total number of failed cases are | desM(t) – Pairing | (Here | X | denotes size of set X). Our task is to prove | desM(t) – Pairing | < ε for small ε.

Proof: We have assumed that comF(t) females are already committed. Let pair(f) denote the male corresponding to female f. We have the assumptions that non-males are excluded, the number of females is far more than males and males are uniformly distributed in their utility values V(m). Let f1 denote a committed female whose corresponding male has the lowest utility value (f1 = f: min(V(pair(f)), f∈comF(t)).V(pair(f1)) is the lowest utility male who could manage to be committed. In the next iteration of pairing we expect males around the same utility to get committed and not one's who are way below the utility value. Let f2denote the lowest utility uncommitted female who may be paired in next iteration. Let pairE(f2) be the expected pair of f2. Mathematically we may write eq. (2).

abs(V(pairE(f2) - V(pair(f1))) ≤ δ (2)

Here abs() is the absolute function. δ is a small number. Equation (2) states that in pairing of the next iteration,any male whole utility is far below (with a margin of more than δ) the minimum utility committed male (as per previous pairings), would not succeed.

However a male m does not know his actual utility V(m) but his perceived utility P(m). From equation (2) we may write that a male only attempts if (equation (3)).

P(m) ≥ P(pair(f1)) – δ (3)

If all males have close to real idea of their utilities (P(m) ≈ V(m)), only uncommitted desirous males in the utility range [V(pair(f1)) – δ, ∞) participate. Since we have a successful case of utility value V(pair(f1)), with the assumption of no change in utility distribution of uncommitted males over time, we may state that the probability that all unsuccessful cases lie between utility values [V(pair(f1)) – δ, V(pair(f1)) + δ]is very high. For small δ the range is small. Hence let unsuccessful cases be MU. (MU = m: V(pair(f1)) – δ ≤ V(m) ≤ V(pair(f1)) + δ). For small δ, | MU | < ε, which completes the proof.

C-factor: However in many cases a person may perceive his utility much higher than the actual utility (P(m)>>V(m). If such cases are large, the number of failed attempts may also be large. For theoretical discussions, let us define C factor of a person based on how high he perceives his utility, than his actual utility. This factor is given by equation (4).

$$C(m)=\begin{cases}0 & P(m)\le V(m)\\ e^{\lambda(P(m)-V(m))^{r}} & P(m)>V(m)\end{cases} \quad (4)$$

Here λ is a constant. Males who have P(m) close to V(m) as per earlier discussions have high chance of being committed, while the ones who have large difference have minimal or no chance. Hence C-factor is on exponential scale, whole value is almost zero for low values of P(m)-V(m), but increases drastically later.

People with high C factor may naturally not get selected. One option in such case is todrastically reduce the perceived values ($P^{t+1}(m) = \alpha(m).P^{t}(m)$, $0<\alpha(m)<1$, $P^{t}(m)$ denotes perceived value at time t). In such a case for large values of α we observeP(m) swiftly converges to V(m) and hence as per above discussions failed cases reduce with time. For an IPG student the maximum tenure would be 5 years, which emphasizes on need of fast convergence. The other option is to have self-confidence and make no change, which may rather be suicidal, but may many times be the option of males with the sole motive of being committed. Broadly speaking the number of males with high C(m) must always be low for low total number of failed attempts. Temporary increase may be controlled by having large α (m). In other words average C factor of first year must be low, and for few cases with high C-factor, the factor must reduce with years, for the number of failed attempts to be low.

Conclusions: Big gang of people on valentine's day at store; gang of boys behind girls fighting to wish valentine's day, birthday, or any other day; cold war in hostels; etc. are all myths and nothing to do with reality. In reality only a few people may be seen in all this. For verification of the proofs on real data agents have been deputed to collect information about proposals at all key locations. Hopefully there should be more findings soon.

Nomenclature: $\subseteq$ (subset), - (set difference/subtraction), $\in$ (is a member of), $\cup$ (union), $\cap$ (intersection), $\forall$ (for all), ϕ (empty set).

Valuable Part Of Me: My Institute

Shweta Kamboj

How much does a new place give us is 'unexpected'.....

I was a girl who never had the nerve to say even a few lines in front of a class of few students. Now, I have expanded my arena so much that now I have courage to participate in each and every activity on a platform in front of everybody. Honestly, I never had those guts.

Not only this, but this institute has given me something more than enjoyment. It is that we all value i.e . education. A very unique tradition in this institute which makes it unique from others is the Peer To Peer learning. I mean, that nowhere else the seniors take the responsibility of making juniors learn the things that they actually need to know. They take out precious time from their busy schedules to make us 'precious'. Another forum we have is E-cell, to boost up the young entrepreneurs. It works on an awesome idea to bring out the innovative notions that may become bigger creations tomorrow.

We all realize that we are at the right place and that is why we value this institute and love this.