

Capture the Flag with Stuff

Jeffrey Grafton (jgrafton) and Chris Martens (cmartens)

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Claim: If you are an element n in the union of the set of Jeff's friends J and the set of Chris' friends C , you should visit CMU and participate in KGB's Capture the Flag with Stuff this spring, on March 25, 2005, to ensure the maximum merriment level possible.

Proof: We shall prove this claim inductively on n .

- **Base case $n = \text{DJ Frazier}$:** DJ Frazier came up to the Fall 2004 game on a whim and enjoyed it immensely. Numerous other participants were also well entertained by his presence.
- **Induction hypothesis:** Assume that if persons 1 through k visit CMU and play *CtFwS*, we have some merriment level m .
- **Induction step:** Now let us suppose that the $k + 1$ st person visits CMU and plays KGB's *CtFwS*. There is some amortized merriment level m associated with this situation. The **Merriment Propagation Lemma** states the following:

The merriment of any given person propagates over close proximity (within earshot) to others such that whenever a merry person is present amongst others, total merriment level increases.

There are two cases:

1. The $k + 1$ st person's merriment level is below that of the rest of the group: In this case, by the Merriment Propagation Lemma, the merriment of the other k people would propagate to the $k + 1$ st person and increase overall merriment.
2. The $k + 1$ st person's merriment level is above that of the rest of the group: In this case, by the Merriment Propagation Lemma, the merriment of the other k people would be increased by the merriment of person $k + 1$, increasing overall merriment.

Therefore, the amortized merriment increases with the addition of person $k + 1$.

Therefore, by induction on n , for any $n \in J \cup C$, n should come play KGB's *CtFwS* to ascertain maximum amortized merriment.

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