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**From:** [REDACTED]  
**Sent:** Wednesday, November 27, 2013 12:25 AM  
**To:** Gordon Getty  
**Cc:** dhaig@oeb.harvard.edu; Alan Rogers; Robert Frank; Jeffrey Epstein  
**Subject:** degree of  $r$  and age

Dear Gordon

I very much like your slimmed down version of Hamilton/Fisher. Certainly collapsing the main equation by  $N=1$  is obvious. Somewhat less so is the matter of defining a benefit ( $B$ ) i.e. an increase in reproductive success, as a change in one's reproductive value, which seems like a more permanent character. In one sense yes: it has just gone up, but does the general, let us say declining in older people rule, still not apply?—and is it bumped throughout by the same benefit recently transferred ?

When I explicitly set out to build a theory of the family I knew the key variables were degree of relatedness, sex and age—yet I never reached a proper synthesis with the latter.

Here I would trust Alan Rogers more than myself; likewise, David Haig has contributed the following, which also references Alan:

Ronald Lee has developed a model of intergenerational transfers that has some interesting properties. The problem is that his model is implicitly one of clonal asexual reproduction ( $r = 1$  for all transfers among individuals). I am not sure whether anyone has achieved a general model for transfers among relatives which is what Gordon is working at.

Lee, R. (2008) Sociality, selection, and survival: simulated evolution of mortality with intergenerational transfers and food sharing. *Proceedings of the National Academy of Sciences, USA* 105: 7124-7128.

Lee, R. D. (2003) Rethinking the evolutionary theory of aging: transfers, not births, shape senescence in social species. *Proceedings of the National Academy of Sciences, USA* 100: 9637-9642.

and Alan Rogers has a commentary:

Rogers, A. R. (2003) Economics and the evolution of life histories. *Proceedings of the National Academy of Sciences, USA* 100: 9114-9115.

Note absence of parent-offspring conflict.

I will write you later re your very interesting piece on discounting. I am copying David on all this

warmest best

bob

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