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**From:** Misha Gromov [REDACTED]  
**Sent:** Monday, December 4, 2017 1:24 PM  
**To:** jeffrey E.  
**Subject:** Re:

Can't say i got it, why "understanding"

On Mon, 4 Dec 2017 07:59:01 -0500, jeffrey E. wrote:

why is transfinite recursion <[https://en.wikipedia.org/wiki/Transfinite\\_recursion](https://en.wikipedia.org/wiki/Transfinite_recursion)> a good model for understanding – the proof that the result is well-defined uses transfinite induction. Let  $F$  to be defined on the ordinals. The idea now is that, in defining  $F(\alpha)$  for an unspecified ordinal  $\alpha$ , one may assume that  $F(\beta)$  is already defined for all  $\beta < \alpha$  and thus give a formula for  $F(\alpha)$  in terms of these  $F(\beta)$ . It then follows by transfinite induction that there is one and only one function satisfying the recursion formula up to and including  $\alpha$ .

(more will be given later): define function  $F$  by letting  $F(\alpha)$  be the smallest ordinal not in the set  $\{F(\beta) \mid \beta < \alpha\}$ , that is, the set consisting of all  $F(\beta)$  for  $\beta < \alpha$ . This definition assumes the  $F(\beta)$  known in the very process of defining  $F$ ; this apparent vicious circle is exactly what definition by transfinite recursion permits. In fact,  $F(0)$  makes sense since there is no ordinal  $\beta < 0$ , and the set  $\{F(\beta) \mid \beta < 0\}$  is empty. So  $F(0)$  is equal to 0 (the smallest ordinal of all). Now that  $F(0)$  is known, the definition applied to  $F(1)$  makes sense (it is the smallest ordinal not in the singleton set  $\{F(0)\} = \{0\}$ ).

it sort of says an approximation to truth. by reduction. alternately we can add other dimensions.

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please note

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JEE

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