Re: Cantor and the binary tree

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- *From*: mueckenh@xxxxxxxxxxxxxxxxx

- *Date*: 5 Jun 2005 01:15:53 −0700

Gottfried Helms wrote:

> I always understood "transfinite number" not being a "count−of−elements"
> (which would be impossible with uncountable sets) but being an index of
> the *type* of infinity (already in mind, that that types have
> somehow an order).

It was Cantor's pride to have extended the domain of numbers having found arithmetic laws connecting the new numbers, the second (zweite Zahlenklasse) and even higher classes of numbers, as he expressed it.

> in the −possible− case, that your tree represents a rule to describe
> a continuum(*1): since then it is referring to a "number of all nodes",
> which cannot be given, if it possibly is "un−countable".

We have a law yielding all possible infinite strings of bits.
We have a law connecting each spring−off, i.e., the source of a newly separated path with a node B:
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B
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This is the basic element of the tree and does nowhere change. Hence it holds all over the tree. It yields a one−to−one relation between nodes and paths. Nobody can reasonably even rise the question whether there could be more paths than nodes. And if it is meaningful to talk about infinity and to count infinity, then it is absolutely clear that nodes and paths have same number.

> The concept "number of" may be assigned to describe an (important)
> property of a finite set, but if we deal with mathematical objects,
> which are constructed to be infinite, it is better to switch to the
> terminus "cardinality" (or maybe a better one), to not apriori throw
> away the ability to include uncountable(*1) infinities in our
> considerations.

The idea of a bijection of a set with N is a convincing one, in many respects. But the idea of considering the basic element

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B
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of a tree is at least as convincing. To do the last step, we could even neglect the terminus "node". Then I assert: There are not more separated paths in the tree than paths which separate themselves somewhere in the tree. Set theorists say: There are more separated paths in the tree than are separated in the tree.

Regards, WM

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- ***Follow−Ups***:
  - ***Re: Cantor and the binary tree***
    - *From:* Gottfried Helms
  - ***Re: Cantor and the binary tree***
    - *From:* Tony Orlow
  - ***Re: Cantor and the binary tree***
    - *From:* Virgil
  - ***Re: Cantor and the binary tree***
    - *From:* imaginatorium

- ***References***:
  - ***Re: Cantor and the binary tree***
    - *From:* Gottfried Helms

- Prev by Date: ***Re: 2 Coding Theory Questions***
- Next by Date: ***Re: how to proof the convergence of a dynamic statistical series***
- Previous by thread: ***Re: Cantor and the binary tree***
- Next by thread: ***Re: Cantor and the binary tree***
- Index(es):
  - ***Date***
  - ***Thread***