4.5A Independence of Simultaneous Non-Microconstant Trials

Sufficient conditions for the independence of simultaneous micro-dynamic trials in a complex system, when the evolution functions are not microconstant

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The following argument refers to the problem as it is set up in section 4.54 of Bigger than Chaos; see especially figure 4.4.

I will give the argument that experiment $A$ in figure 4.4 is microconstant; the argument for $B$ is, of course, identical. If there is at least one trial between $W$ and $X$, then $A$ is a trial on a multi-mechanism experiment, and so, because the conditions for the independence of chained trials are by assumption satisfied, it is microconstant (for reasons given in sections 3.74, 3.76, and 3.7A).¹ If $W$ occurs immediately before $X$, but $X$ is microconstant, then $A$ is identical to $X$ and is therefore microconstant.

The only other possibility consistent with the satisfaction of the assumptions required for the independence of sequential trials is that $W$ occurs immediately before $X$, that $X$ is not microconstant, but that the $\text{ic}$-evolution induced by $W$ is folding and well-tempered. In this case, I use a simple redescription to construct a microconstant $A$ from the non-microconstant $X$. $A$ will be identical to $X$ except for its $\text{ic}$-variable; by packing additional information into the microvariable for $A$, I make $A$ microconstant even though $X$ is not.

The technique, which assumes familiarity with section 3.7A, is as follows. Because $\text{ic}$-evolution on $W$ is folding, a set of $\text{ic}$-values for $W$ determines both a member of $W$’s buffer partition and a set of $\text{ic}$-values for $X$. What I want to do is to put an index identifying the buffer partition member together with the $\text{ic}$-values for $X$ to create a new value concerning which (a) the buffer partition member index is high level information and (b) the $\text{ic}$-value for $X$ is low level information. This new value will be the $\text{ic}$-value for $A$.

Suppose, to take a simple example, that $X$ has one $\text{ic}$-variable $\zeta$ that takes on any real value between 0 and 10, and that $W$’s buffer partition

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¹. If $X$ is not microconstant and there are only a few trials between $W$ and $X$, the multi-mechanism experiment may not be very microconstant. In such circumstances, use the construction described below for the case where $W$ immediately precedes a non-microconstant $X$. 
has twenty members. I assign the twenty members of the buffer partition each an index, say an integer $i$ between 1 and 20, and then define the $\text{iC}$-variable $\zeta'$ for $A$ to be

$$\zeta' = 10i + \zeta$$

where $\zeta$ is the $\text{iC}$-value for $X$ and $i$ is the index of the buffer partition member picked out by the $\text{iC}$-value of $W$. Because the mechanism for $A$ is just the mechanism for $X$, the evolution function for $A$ will depend only on the value of $\zeta$, so adding the high level information to the $\text{iC}$-value for $A$ makes no difference to the behavior of $A$, which will be, as desired, identical to that of $X$. The point of all this is that the evolution function for $A$ will be microconstant, with a constant ratio partition corresponding to $W$’s buffer partition. (Note that this construction is possible only because $X$ is embedded in a chain with folding $\text{iC}$-evolution; otherwise, $i$ would be undefined.)