Dynamical systems, by G. D. Birkhoff, American Mathematical Society Colloquium
Publications, vol. IX, 295 pp.

In these colloquium lectures the author presents in one volume the ideas and
results which he has derived in the last score of years of his work on dynamical
theory. It is *modern dynamics* in a sense to which the world has grown accustomed
since the thought of Poincaré has become its intellectual heritage. The scope of the
work is realized when it is considered in detail.

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When we turn from considering the work in its detailed aspects to regarding it
as a whole, our task is difficult: we attempt to review a book, and find that we are
commenting on a theory. This very circumstance is more eloquent than any words
of our own.

How is the value of a mathematical discipline to be judged? Is it in the view
which it discloses of the physical world, and which could not be had without its aid?
If this is the case, then the developments which we are considering promise much,
since they are, in their historical origin, purely physical. But they have traveled a
great distance from their beginnings, and have taken the aspect of a deep analysis
of methods which have proved effective in the past, rather than that of the direct
study of physical reality. Moreover, there is one circumstance which is ominous, and
that is that the properties most often considered are properties which are changed
altogether by an infinitely small change in the physical conditions attendant on the
problem, or by the slightest change in initial data. In the world of measurement
such properties find little place.

Is the value of a discipline to depend on its relations with other parts of the
science? Our review has been unsuccessful indeed if it has failed to bring into light
not only the broad connections of the subject with the existing science, but the
promise which it gives of initiating further developments in mathematics.

But there is an intellectual criterion which is ultimate, which differs from those
others which seek the value of a theory outside the theory itself. It is the judgment
of its esthetic worth, the appreciation of its structure. It is perhaps more noteworthy
that dynamical theory should have acquired a value of this sort than, for example,
projective geometry, or the theory of groups. And to our author more perhaps than
to any other man belongs the credit that this is so.

B. O. Koopman

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