is given by $(ct/2)^2=(ut/2)^2+y^2$ where c is the velocity of light as measured by A (see Fig. 3). Therefore

$$ct=2\ ky=2kx' \qquad (1)$$

where $1/k^2=1-u^2/c^2$. For the second journey the same time interval $t=t_1+t_2$ where $ct_1=x_1+ut_1$ and $ct_2=x_1-ut_2$ (see Fig. 4). Therefore $ct=2k^2x_1$, and therefore $x'=kx_1$ relates *lengths* as measured by A and B. x' is the distance of a point from B's origin as measured by B; hence x' is B's coordinate of the point. x_1 is the same distance as measured by A, but at time t B's origin will be a distance ut from A's origin so that $x_1=(x-ut)$. Therefore $x'=k(x-ut)$ relates coordinates.

Appendix 4: Correlation of *B*'s Clocks with those of *A*

To correlate the clocks A again describes B's actions. A light signal sent by B from his origin along his y' axis to be reflected by a mirror at distance y' back to his origin O' will travel for a time $t_0'=2y'/c'$ where c' is the velocity of light as measured by B in terms of his standards. A will say that the signal returns to B's origin after a time $t_0=2ky/c$ from equation (1) because $y=y'$ when the reading on B's clock at his origin is t'_0. The reading on A's clock at the point $x_0=ut_0$ is t_0 where $c't'_0=ct_0/k$, if the clocks at the origin gave the source readings at the instant where the two origins coincided. This correlates the clocks at the origins.

If at time t'_0 at B's origin a light signal is sent to a point x' from B's origin it will arrive at a time $t'=t'_0+x'/c'$ on B's clock at the point x'. Therefore $c't'=ct_0/k+kx_1$ where x_1 is A's measure of B's distance x_0. Let t_1 be the time interval as measured by A during which the light signal traverses B's distance x'. Let x be the coordinate in A's system of the end point of x' and t be the time on A's clock when the light signal arrives. Then $x=ut+x_1$, $t=t_0+t_1$ and $ct_1=x_1+ut_1$. Solving t_0 and x_1 in terms of t and x (see Fig. 5)

$$t_0=t-x-\frac{x-ut}{c-u} \text{ and } x_1=x-ut$$

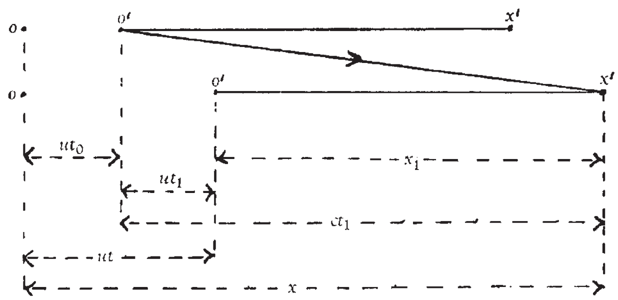

Fig. 5. Correlation of *B*'s clocks with those of *A*.

Hence $c't'=k(ct-ux/c)$ which together with $x'=k(x-ut)$ forms a generalized Lorentz transformation.

According to B the velocity of A's origin $x=0$ is given by $u'=x'/t'=-uc'/c$ so that if B decides to choose his time unit so that $u'=-u$ then it follows that $c'=c$. This is not a mysterious law of nature but is the outcome of using light signals to set up space–time coordinate systems.

W. STEWART BROWN

Department of Physics,
Heriot-Watt University,
Edinburgh.

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Special Theory of Relativity

As the result of a lengthy correspondence with Professor Dingle, I am of the opinion that the contradiction described by him[1] is due to the incompatibility of (*a*) the concepts used in the special theory of relativity as ordinarily understood, and (*b*) the concept of clocks that run regularly, as understood by Professor Dingle. I believe that Professor Dingle agrees that this is a correct diagnosis of the cause of the contradiction. To resolve it, one must abandon either (*a*) or (*b*). Because (*b*), as elucidated in our correspondence, is equivalent to Newton's concept of absolute time, and because relativistic physics appears to me to represent nature more closely than Newtonian physics does, I cast my vote for the abandonment of (*b*) and the retention of (*a*).

J. L. SYNGE

Dublin Institute for Advanced Studies,
School of Theoretical Physics,
Dublin.

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Hybrid 30S Ribosomal Particles reconstituted from Components of Different Bacterial Origins

by

MASAYASU NOMURA
PETER TRAUB
HELGA BECHMANN

Laboratory of Genetics,
University of Wisconsin,
Madison, Wisconsin

Functional 30S ribosomal subunits can be reconstructed from the 16S ribosomal RNA of one species of bacteria and the ribosomal proteins from a distantly related species.

THE structural and functional role of ribosomal RNA in the ribosome has long been a matter of conjecture. Success in the reconstitution of functionally active 30*S* particles from free RNA and proteins[1] has now made it possible to study this problem experimentally. We have already shown[1] that 16*S* ribosomal RNA from yeast, 18*S* ribosomal RNA from rat liver, or "16*S*" RNA derived by degradation from 23*S* *E. coli* ribosomal RNA