the relativity of motion is manifestly the same thing to say (1) that referred to axes fixed in the earth all the stars describe circles every day about the polar axis, or (2) that referred to axes fixed among the stars the earth rotates about its polar axis once a day. If any ground can be alleged for holding that one of these statements is the simpler, that is a ground for a certain choice of axes, not for saying that one motion is "real" or "absolute," and the other "relative" or "apparent."

All the so-called "proofs of the earth's rotation" are deductions from particular experiences which show that other motions besides the diurnal relative motions of the earth and stars are more simply expressed by referring to axes fixed among the stars than by referring to axes fixed in the earth. They all depend on the specification of "the acceleration due to gravity near the earth's surface. The neighbourhood of the earth is a field of force, and the magnitude and direction of the force at any point on the earth is determined by reference to the earth as origin, and to axes fixed in directions with reference to the stars. The field is then expressed by the law of gravitation.

It is worth while to elucidate this matter in greater detail by an examination of the most famous of these "proofs," that by means of Foulcaut's pendulum. What is observed is that if the pendulum is really free to swing about an absolutely fixed axis, (i.e., one fixed above the same point of a horizontal table (fixed with reference to the earth) when at the lowest point of its swing, then the plane of vibration turns slowly round, so that the line of vibration always passes above the same point. If we observe now, on another line drawn on the bobbing of the oscillation in the line being practically simple harmonic. If this motion were referred to axes fixed with reference to the table, there would be a component acceleration from the bob of the pendulum towards the point of support (to be accelerated for by the constraint), a component acceleration in the plane of vibration at right angles to the former (which we should recognise as a component of gravity), and a component acceleration perpendicular to the plane of vibration, proportional at any instant to the velocity in the simple harmonic motion. If we had nothing else to guide us, no observation of the stars, no theory of gravitation, but only the observation of falling bodies, we should have to do two things: we should have to try to simplify the specification of the acceleration of the bob of the pendulum by referring to a new set of axes, and we should have to conclude that our previous observations of falling bodies had disclosed all the facts about the field of force in the neighbourhood of the earth. We should simplify the specification of the observed accelerations by referring to axes which (relative to the earth) rotate with the plane of vibration of the pendulum, and we should conclude that such axes are required in order that the laws governing the motion of falling bodies be correctly formulated. What the experiment with Foulcaut's pendulum really proves is not that the rotation of the earth relative to the stars is an "absolute motion," but that the system of axes, with reference to which the acceleration of a free body near the earth's surface is of constant amount and direction towards the earth's centre, is not fixed in the earth, but (relative to axes fixed in the earth) these axes rotate with the stars.

It will be found on examination that every other so-called "proof of the earth's rotation" is of the same character. By each it is shown that the earth rotates in the same time and in the same way relative to the axes required for the statement of the law of gravitation as relative to the stars. It is not legitimate to suppose that two relatives make one absolute.

It is true that the conclusion at which we have arrived takes longer to state, and appears at first sight less simple than the statement of a way of "absolute motion," but it contains no undefined terms, and no reference to anything assumed to exist, but about which nothing can be known.

Objection has been taken to the attempt to express mechanical theory in terms of relative motion, on the ground that it will be perplexing to beginners, and difficult at any stage. In answer to this it may be urged that in teaching beginners there is no need to say anything about either relativity or absoluteness. The end which that interest them is the motions relative to the motions of boats, trains, cricket-balls, billiard-balls, and machinery; things that can be sufficiently described by reference to axes fixed in the earth. It is only at a later stage in general mechanical theories have to be studied, and a foundation laid for physical astronomy and mathematical physics, that it is proper to insist on the relativity of motion; and at this stage it appears to me more important that our statements of principles should be free from metaphysical obscurity than that they should be verbally short.

A. E. H. Love.

The Antiquity of the "Finger-Print" Method.

Sir William Herschel, in his letter to Nature (Nov. 22, p. 77), expresses his unbelief in the statement in the Nineteenth Century (Nov. 211, p. 265), which attributes to the Chinese the original invention of the "finger-print" method of personal identification. While I do not know upon what Mr. Spearman has founded this statement, I have collected from a few sources some facts which seem to justify the claim made on behalf of the Chinese.

Although at present I have no record to refer to, it is a fact that every Japanese, old enough to have outlived the ancien régime, stamps the ends away of the thumb and four fingers, which then current usage of "stamping with the thumb" (Bo-in) on legal papers, popularly called "nail-stamp" (Tsumi-in), on account of the common use of a thumb with the edge of its nail in ink; whereas on papers of solemn contract, accompanied by written oath, the "blood-stamp" (Keppan), or the stamp of the ring-finger in blood drawn therefrom, was demanded.

Nakamura Katsurakawa, the "fingerprint" (1574-1808), writes the subject as follows: "According to the Domestic Law" (Korei), to divorce the husband must give her a document stating which of the Seven Reasons was assigned as the cause of the action... and after her husband's name sign with his own index-finger. Perhaps this is the first mention [in Japanese literature] of the "finger-print" method. (1) This Domestic Law forms a part of the Laws of Taishō, enacted in 702 A.D. with some exceptional points of these "Laws" were borrowed and transplanted from the Chinese "Laws of Yung-Hwai" (citra 650-55 A.D.) (2); some appears which the Chinese of the 7th century A.D. had already acquired the "finger-print" method.

After the above-quoted passage, Katsurakawa continues thus: "That the Chinese apply on divorce-papers the stamps of the ends away of the thumb and four fingers, which they call Shou-mi-yin (i.e., hand-pattern stamp) is mentioned in Shwui-hi-chuen, &c." (3). This "Shwui-hi-chuen" is one of the most popular novels enjoyed by the modern Chinese so popular that I have met with many Chinese labourers possessing it in the West Indies; its heroes flourished about 1150, and its author lived in the twelfth or thirteenth century A.D. (4). As is usual with many heroes this gives us more accurate knowledge of minor institutional features that co-existed with either the heroes or the author, or both (5). After making careful search in this novel, I can now affirm that the Chinese in the twelfth or thirteenth century used the fingerprints, not only in divorce, but also in criminal cases. Thus the chapter narrating Lin Chung's divorce of his wife, has this passage: "Then Lin Chung, after his ammunisent had copied what he dictated, marked his sign-character, and stamped his hand-pattern" (6). And in another place, giving details of Wu Sung's capture of the two women, the murderers of his brother, we read: "He called forth the two women; compelled them both to ink and stamp their fingers; then called forth the neighbours; made them write down the names and stamp [with fingers]" (7).

It has been lately suggested by my friend, Mr. Teitaro Nakamura, that possibly the "fingerprint" method was merely a simplified form of the "hand-stamp," which latter method had once been so current in Japan that it gave to the documents the common names "Tegata" (i.e., hand-pattern) and "Ochite" (i.e., impressed hand) (8). This view applies equally well to

1 The "thumb-stamp" was equally regarded with the formal engraved seal (Shiwa-in), but the "blood-stamp" had nothing to do for identification. For the formula of the latter mode of stamp, see Oku, "Ichiu Ichibun," in the edition, Tokyo, 1882, vol. iv. p. 511.

2 The Seven Reasons for divorcing the wife are: (1) filial disobedience; (2) barrenness; (3) licentiousness; (4) theft; (5) treachery; (6) incurable disease; (7) larceny.

3 It must not be presumed as a fact that after the "finger-stamp" was introduced, it soon supplanted the hand-stamp"; for even in the seventeenth century the latter was sometimes used, as is instanced in the writing of Kato Kyokuma in a manuscript preserved in a manuscript in a monk's house at Tokyo. Cf. Kitamura, "Kiyu Shohan, new edition, 1882, vol. iv. p. 16."
Peculiarities of Psychical Research.

MAY I enter an emphatic protest against the notion insinuated both by Mr. Wells and Prof. Karl Pearson, that Psychical Researchers are a sort of sect engaged in spiritualism, or other propaganda? Most people, I am afraid, fight shy of psychical research, either because they are afraid that if there is anything in it it is the devil, or because they have a scientific reputation which is afraid of losing, I do not know to which category Mr. Wells belongs, but apparently he fails to understand that in order to make out a case against psychical research, he has got to show, not that the existence of telepathy and clairvoyance has not been proved, but that there is not even a prima facie case worth investigating. When we remember that ten years ago 'mesmerism' was included along with telepathy and clairvoyance, we shall not attach much importance to such efforts to stifle inquiry. Even if the result should be to confirm Mr. Wells's anticipation, and show that all the coincidences that have been reported can be explained away as mistakes or mis-statements, and as the inquiry will yet have been worth the labour bestowed on it, if only as affording a measure of the value of testimony to the miraculous. And if this comes to pass, the bigots of science will be ready enough to claim a share in the work, if only by saying, 'I told you so.'

I do not know what Prof. Karl Pearson means by his quite gratuitous attack on the scientific acumen of the psychical researchers. Surely he cannot imagine that they overlooked the point which he has unearthed? The instructions of the experiments were, that 'the agent should draw a card at random, and cut the pack between each draw' ('Phantasms of the Living,' vol. i. p. 33, foot-note). Could an abnormal distribution of the cards affect the result if those precautions were taken, or has the Professor any reason to suppose the instructions were not carried out? EDWARD T. DIXON.

Cambridge, December 14.