

# "AI" – 인공지능의 과거와 미래 X

(‘AI’ - Next Strategy in the Era of AI)

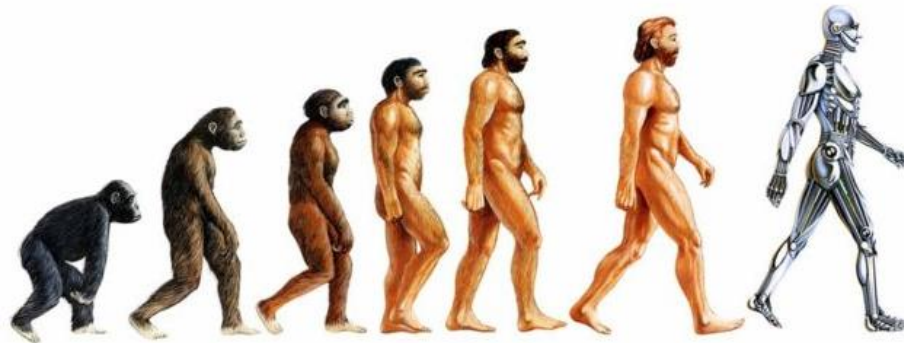
근대 통계학의 아버지

람버트 아돌프 자크 케틀레( Lambert Adolphe Jacques Quetelet )

“인간의 행위법칙은 그 본성상 확률적이다”

2017.11.09

Jason, Min





Lambert Adolphe Jacques Quetelet (1796~1874)

## 저서 : 인간과 능력 개발에 대하여(1835)

벨기에의 통계학자, 수학자, 천문학자, 사회학자 1796.2.22~1874.2.17,  
1819년 University of Ghent 수학 박사 학위

케틀레는 어린 시절 갑작스런 부친의 사망으로 생계를 책임져야 했는데, 평소의 문학적 소질과 언변을 바탕으로 동네 아이들에게 수학을 가르쳐 집안에 보탬을 주었습니다. 이때 아이들은 케틀레의 수업을 무척 재미있어 했다고 합니다. 대학 졸업 후, 강의를 하며 지내던 케틀레는 우연한 기회에 수학의 거성들을 만나게 되고 통계에 관심을 갖게 되었습니다. 통계학 연구에 몰입한 케틀레는 수학은 물론 대부분의 사회현상이나 경제학 등 실생활에서 다양한 방면에 통계가 적용된다는 것을 알았습니다. 케틀레는 연구를 거듭하여 '케틀레 지수'를 발표하는 등 근대 통계학을 정립

□ 사회 과학에 통계를 적용

- 사회 현상의 압도적인 복잡성과 측정을 필요로 하는 많은 변수를 인식
- 목표 : 범죄율, 결혼률 또는 자살률과 같은 현상의 근본적인 통계법을 이해하는 것

관찰되는 개체의 수가 많아질 수록 개체의 신체적 혹은 도덕적 특성들은 점점 더 사라지게 될 것이다.  
이는 일반적인 사실들이 우세해지도록 만든다

'체질량지수'(BMI, Body Mass index) : '사회물리학'을 개발하는 과정에서 사회적 특성을 파악하는 수단으로 고안했던 것

$$BMI = \frac{\text{몸무게(kg)}}{\text{신장(m)}^2}$$

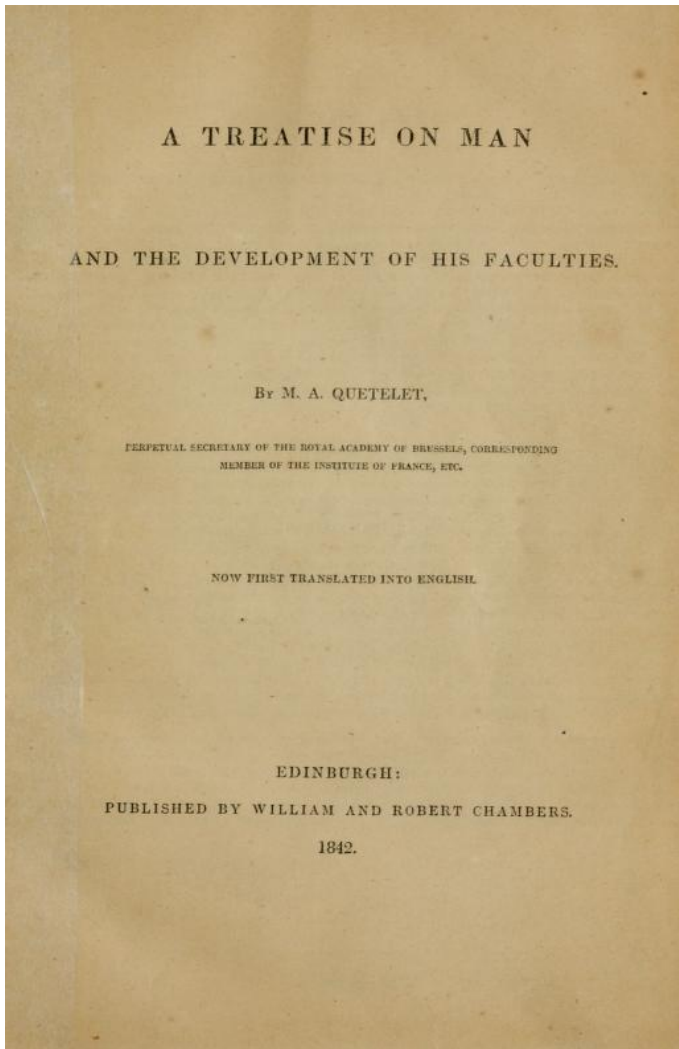
( ~20 체중미달, 20~25 정상, 25~30 과체중, 30~ 비만 )

결과는 원인에 비례한다

□ 1835년 발표한 '인간과 능력개발에 관한 연구'

- 사람, 월별, 지역별, 기온별, 시간별 출생률과 연령, 직업, 지역, 계절과 장소에 따른 사망률을 조사하며 신장과 체중, 성장률, 음주와 정신병력 여부, 자살, 범죄 등도 변수에 넣었다. 결과물은 출간과 동시에 '문명사의 신기원'이라는 평가를 받음.
- 영국의 정치산술, 독일의 국상학(國狀學, 주민과 지리 환경 중심의 통계), 프랑스 확률론을 한데 묶은 이 책자는 근대 통계학의 출발점으로 꼽힘

명성을 얻은 그는 국제통계학회(1853년)을 세우고 1874년 78세로 사망하기까지 범죄통계학의 문도 열었다.



<https://archive.org/details/treatiseonmandev00quet>

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## INTRODUCTORY.

MAN is born, grows up, and dies, according to certain laws which have never been properly investigated, either as a whole or in the mode of their mutual reactions. Hitherto, the science of Man has been limited to researches, more or less complete, respecting some of its laws, to results deduced from single or insulated observations, and to theories often based on mere glimpses; and these constitute pretty nearly all the materials it possesses. It must be admitted, however, that for nearly two centuries various distinguished men have studiously inquired into the rate of reproduction and mortality of mankind; the differences which age, sex, profession, climate, and seasons, produce in regard of births and deaths, have been assiduously studied. But they have neglected to put forward, with sufficient prominence, the study of his physical development (*bodily growth*), and they have neglected to mark by numbers how individual man increases with respect to weight and height—how, in short, his forces are developed, the sensibility of his organs, and his other physical faculties. They have not determined the age at which his faculties reach their maximum or highest energy, nor the time when they commence to decline. Neither have they determined the relative value of his faculties at different epochs or periods of his life, nor the mode according to which they mutually influence each other, nor the modifying causes. In like manner, the progressive development of moral and intellectual man has scarcely occupied their attention; nor have they noted how the faculties of his mind are at every age influenced by those of the body, nor how his faculties mutually react.

It will be evident that I do not speak here of the speculative sciences, which, for a long time, have unravelled with great acuteness the greater part of the questions within their scope, and which they could attempt directly, avoiding, however, all numerical appreciation of the facts. The void resulting from this neglect must be filled up by the sciences of observation; for, either from a distrust in their own strength, or a repugnance in supposing it possible to reduce to fixed laws what seemed to flow from the most capricious of causes, it has hitherto been deemed expedient by learned men to abandon the line of inquiry employed in the investigation of the other laws of nature, so soon as the moral phenomena of mankind became the object of research. It must also be admitted, in explanation, that observations having for their object the *Science of Man*, present difficulties exceedingly great, and, to merit confidence, must be collected upon a scale far too extended to be attempted by an individual philosopher. Thus, we need not be at all surprised if facts respecting the increase of human weight and height from birth, be not readily found—if even the development of man's bodily strength be not exactly known; and it ought to excite no surprise, if, on these interesting points, the results be confined to mere sketches.

The study of the development of the intellectual

qualities present, perhaps, still greater difficulties; but the result will show that these difficulties are more apparent than real.

With respect to the physical or animal forces, it is readily enough admitted that their development depends on the action of nature, and is thus regulated by laws which in certain cases admit of being determined by numbers; but it is asserted, that in respect of the moral or intellectual faculties, over which our volition exercises an influence, it would seem to approach an absurdity, to inquire into laws influenced by a cause at once so capricious and so anomalous as the human will. Hence it has happened that, in the study of man, a difficulty, seemingly insurmountable, was encountered at the very first step; but this difficulty is connected principally with the solution of a question which we shall now examine.

## Are Human Actions regulated by Fixed Laws?

Experience alone can with certainty solve a problem which no *a priori* reasoning could determine. It is of primary importance to keep out of view man as he exists in an insulated, separate, or in an individual state, and to regard him only as a fraction of the species. In thus setting aside his individual nature, we get quit of all which is accidental, and the individual peculiarities, which exercise scarcely any influence over the mass, become effaced of their own accord, allowing the observer to seize the general results.

Thus, to explain our meaning by an example—we may instance the case of a person examining too nearly a small portion of a very large circle, and who, consequently, would see in this detached portion merely a certain quantity of physical points, grouped in a more or less irregular manner, and so, indeed, as to seem as if they had been arranged by chance, notwithstanding the care with which the original figure may have been traced. But, placing himself at a greater distance, the eye embraces of necessity a greater number of points, and already a degree of regularity is observable over a certain extent of the segment of the circle; and, by removing still farther from the object, the observer loses sight of the individual points, no longer observes any accidental or odd arrangements amongst them, but discovers at once the law presiding over their general arrangements, and the precise nature of the circle so traced. But let us suppose, as might happen, that the different points of the arch, instead of being material points, were small animated beings, free to act according to their will, in a very circumscribed sphere, yet these spontaneous motions would not be perceived by the eye placed at a suitable distance.

It is in this way that we propose studying the laws which relate to the human species; for, by examining them too closely, it becomes impossible to apprehend them correctly, and the observer sees only individual peculiarities, which are infinite. Even in those cases where the individuals exactly resemble each other, it might still happen that, by examining them separately, some of the most singular laws to which they are

subject, under certain influences, might escape for ever the notice of the observer. To him, for example, who had examined the laws of light merely in a single drop of water, the brilliant phenomenon of the rainbow would be totally unintelligible—it might even happen that the idea of the possible existence of such an appearance would never have occurred to him unless accidentally placed in favourable circumstances to observe it.\*

What idea should we have of the mortality of mankind by observing only individuals? Instead of the admirable laws to which it is subject, our knowledge would be limited to a series of incoherent facts, leading to a total misapprehension of the laws of nature.

The remarks we make respecting human mortality, may be equally extended to man's physical and moral faculties. (To attain a knowledge of the general laws regulating these latter (moral) faculties, a sufficient number of observations must be collected, in order to bring out what is constant, and to set aside what is purely accidental. If, in order to facilitate this study, all human actions could be registered, it might be supposed that their numbers would vary from year to year as widely as human caprice. But this is not what we in reality observe, at least for that class of actions of which we have succeeded in obtaining a registry.) I shall quote but a single example; but it merits the attention of all philosophic minds. In every thing which relates to crimes, the same numbers are reproduced so constantly, that it becomes impossible to misapprehend it—even in respect to those crimes which seem perfectly beyond human foresight, such as murders committed in general at the close of quarrels, arising without a motive, and under other circumstances to all appearance the most fortuitous or accidental: nevertheless, experience proves that murders are committed annually, not only pretty nearly to the same extent, but even that the instruments employed are in the same proportions. Now, if this occurs in the case of crimes whose origin seems to be purely accidental, what shall we say of those admitted to be the result of reflection?\*

This remarkable constancy with which the same crimes appear annually in the same order, drawing down on their perpetrators the same punishments, in the same proportions, is a singular fact, which we owe to the statistics of the tribunals. In various writings, I have done my utmost to put this evidence clearly before the public:† I have never failed annually to re-

\* The following is the result of the reports of criminal justice in France, &c. &c.

	1826.	1827.	1828.	1829.	1830.	1831.
Murders in general, - -	341	284	257	231	205	208
Gun and pistol, - - -	26	64	60	61	57	40
Salve, sword, stiletto, poniard, dagger, &c., -	15	7	8	7	12	20
Knife, - - - - -	29	40	34	30	44	34
Cudgels, cane, &c., - -	23	28	31	24	12	21
Stones, - - - - -	20	26	21	21	11	9
Cutting, stabbing, and bruising instruments, -	35	60	42	45	65	49
Strangulations, - - -	2	5	2	2	2	4
By precipitating and drowning, - - - -	6	16	6	1	4	3
Kicks and blows with the fist, - - - - -	28	12	21	23	17	26
Fire, - - - - -	1	1	1	1	1	1
Unknown, - - - - -	17	1	2	2	2	2

† See page 43 of the *Recherches Statistiques*, &c., 1809; page 178 of the fifth volume of the *Cours de Mathématique*; page 214 of the same collection. In the observations on the constancy observed in the number of crimes committed; page 69 of the *Recherches sur le Peuple de Paris*, &c. [Inquiries into the Propensity to Crime, &c.] After having reported positively the same statement so many times, I read the following words I confess with surprise, in 1828, in an *Essay on the Moral Statistics of France (Statistique Morale de la France)*, the author of which honours me with his correspondence, and is acquainted with my writings:—

peat, that there is a budget which we pay with faithful regularity—it is that of prisons, dungeons, and scuff-folds. Now, it is this budget which, above all, we ought to endeavour to reduce; and every year, the numbers have confirmed my previous statements to such a degree, that I might have said, perhaps with more precision, "there is a tribute which man pays with more regularity than that which he owes to nature, or to the treasure of the state, namely, that which he pays to crime." Sad condition of humanity! We might even predict annually how many individuals will stain their hands with the blood of their fellow-men, how many will be forgers, how many will deal in poison, pretty nearly in the same way as we may foretell the annual births and deaths.

† Society includes within itself the germs of all the crimes committed, and at the same time the necessary facilities for their development. It is the social state, in some measure, which prepares these crimes, and the criminal is merely the instrument to execute them. Every social state supposes, then, a certain number and a certain order of crimes, these being merely the necessary consequences of its organisation. This observation, so discouraging at first sight, becomes, on the contrary, consolatory, when examined more nearly, by showing the possibility of ameliorating the human race, by modifying their institutions, their habits, the amount of their information, and, generally, all which influences their mode of existence. In fact, this observation is merely the extension of a law already well known to all who have studied the physical condition of society in a philosophic manner: it is, that so long as the same causes exist, we must expect a repetition of the same effects. What has induced some to believe that moral phenomena did not obey this law, has been the too great influence ascribed at all times to man himself over his actions: it is a remarkable fact in the history of science, that the more extended human knowledge has become, the more limited human power, in that respect, has constantly appeared. This globe, of which man imagines himself the haughty possessor, becomes, in the eyes of the astronomer, merely a grain of dust floating in the immensity of space; an earthquake, a tempest, an inundation, may destroy in an instant an entire people, or ruin the labours of twenty ages. On the other hand, when man appears most influenced by his own actions, we see paid an annual tribute to nature of births and deaths, as regular as may be. In the regular reproduction of crime, we see again reproduced another proof of the narrow field in which he exercises his individual activity. But if each step in the career of science thus gradually diminishes his importance, his pride has a compensation in the greater idea of his intellectual power, by which he has been enabled to perceive those laws which seem to be, by their nature, placed for ever beyond his grasp.

‡ It would appear, then, that moral phenomena, when observed on a great scale, are found to resemble physical phenomena; and we thus arrive, in inquiries of this kind, at the fundamental principle, that the greater the number of individuals observed, the more do individual peculiarities, whether physical or moral, become effaced, and leave in a prominent point of view the general facts, by virtue of which society exists and is preserved.¶ It belongs only to a few men, gifted with superior genius, to alter sensibly the social state; and

¶ Each year reproduces the same number of crimes. In the same order, in the same regions. Each class of crimes has its peculiar and invariable distribution, according to the sex, age, season; and is accompanied, in equal proportions, with accessory facts, unimportant in appearance, and, but for their return, inexpressible. It becomes necessary to give examples of this fact in this constancy in the reproduction of facts hitherto considered as inexplicable (individuellement dans leur ensemble), and as being subject to no law. I shall make only one observation, which is, that I never considered the number of crimes invariable. I believe, on the contrary, in the possibility of the human species.

The extreme rarity of sickness and mortality among the crews of vessels employed in the arctic regions, when exposed to a lower temperature, and still more sudden vicissitudes than any we have had to record, affords a striking illustration how little the constitution of our countrymen is likely to be affected even by the severest climate to which they are exposed.

While febrile affections of the intermittent and remittent types prevail during spring and autumn, bowel complaints during summer, catarrhs and all the train

of pulmonary affections during spring and the commencement of the winter, there are comparatively few diseases of any kind during the severest part of the season, except those of the eyes, induced by the reflection of the snow, frost-bites from exposure, and a few cases of acute rheumatism and pneumonia, which, however, may be said to prevail with equal severity at other periods of the year.†

The following table is also curious and interesting, as contrasting the soldier and the civilian.

	Ages.	By Tables of Scotch Benefit Societies.	By Tables of English Benefit Societies.	Returns of East India Company's Labourers in London.	Returns of Portsmouth Dock Labourers.	Returns of Woolwich Dock Labourers.
Constantly Sick per 1000,	30 to 30 30 to 40	11.4 13.2	15.4 18.3	15.6 13.6	10.9	20.4
Average number of Days Sick in each Year, - -	20 to 30 30 to 40	4.1 4.8	5.6 6.6	4.02 5.06	7.3	8.5
Average Duration of each Attack of Sickness, - -	20 to 30 30 to 40	.. ..	.. ..	10.7 22.6	13.2	..

In the third report by Major Tulloch, the two extremes are happily contrasted, viz., Western Africa and the Cape of Good Hope; the latter, perhaps—nay, almost certainly—the healthiest climate in the world, the former proverbial for being a grave to Europeans. His details fully bear out the general character of the stations. In conclusion, it may be remarked, that, independent of all other important results, these reports are peculiarly valuable from the ample refutation they afford, to all minds open to conviction, of the more generally received medical theories in respect to the causes of many fatal and harassing diseases. They may also prove of much practical benefit, in freeing the minds of emigrants from those terrors which the very thought of particular localities has long been apt to induce. Rheumatism

and ague rise to the mind, whenever men think of a Canadian winter; but we find that, in reality, the soldiery in the Mauritius suffer more severely from that disease than they do in British America. In short, Major Tulloch's elaborate researches lead to the conclusion, that atmospheric causes, operating on all climates in common, and modified only to a comparatively slight degree by local circumstances, form the great source of the morbid influences affecting man kind. When this point is more fully investigated, and fitting remedial means discovered, emigration will be stripped of half its difficulties, and a new lease given to civilised man, as it were, of a large portion of the globe, of which at this moment he can scarcely be called the occupant.

END OF TREATISE ON MAN.



“만약 당신이 미래를 꿈꾸지 않거나 지금 기술개선을 위해 노력하지 않는다면 그건 곧 낙오되고 있는 것이나 마찬가지입니다.”

그윈 쇼트웰(Gwynne Shtwell, SpaceX CEO, COO)

# 감사합니다

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