

considered as just one of those, the decision of which in favour of the Office, enables it to meet the claims arising on account of those that are decided against it. Having stood the risk of an adverse decision, the Office must not be called upon to surrender the consideration in respect of which it undertook that risk.

Mr. Younger intimates that one object he proposed to himself in the devising of his scheme was to exhibit a less value of the measure of deterioration than that exhibited by the existing method. The simplest way of doing this would have been to strike off a percentage from the result of the usual method, which way, moreover, would have had the further advantage of letting us know exactly what we were about. This, Mr. Younger's way of proceeding does not do. It is too complex for that. In fact, it is apt to remind one of the proceedings of the scientific tailors of Laputa, who, disdaining the use of a tape for the measuring of their customers, employed a sextant instead. The customers were, to be sure, very badly fitted. But what of that? The process was conducted on strictly scientific principles.

I am, Sir,

Yours most obediently,

Camden Town, 3rd December, 1862.

P. GRAY.

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#### PROFESSOR DE MORGAN'S QUERY ABOUT INTEREST ACCOUNTS.

*To the Editor of the Assurance Magazine.*

SIR,—Under the head of "Notes and Queries," in your *Magazine* for October, I find a notice by Professor De Morgan of a mismanaged interest account.

The Professor does not state the method his friend followed; so with your permission I shall endeavour to point out what has to be considered in making up an interest account of the nature described, on equitable principles—the course the debtor most likely followed—and the errors he fell into.

When money is lent at a certain rate of interest, no dates for the payment of such interest being mentioned, it is understood to be paid once a year; and if interest falls in arrear, and no penalty has been mentioned in the agreement, the least that can in equity be expected of the debtor is that he pay interest at the same rate on the arrears.

In framing an ordinary account current it is usual to calculate the interest on each Dr. and Cr. balance for the time it exists (within a year), keeping a note of the Dr. and Cr. interest, and to add or deduct, as the case may be, the difference at the end of each year. If interest be charged and allowed at the same rate, this method is the same as charging interest on each advance, and allowing interest on each payment, from the date it is made to the end of the year. A new accounting then commences, and the process is carried on from year to year during the continuance of the account. If there is but one payment made in each year, and that on the day the interest falls due, this process becomes similar to that described by Professor De Morgan—interest for the period is added to the principal, and the payment just made deducted; and this is the proper plan, whether the payment exceeds the interest or not. It would thus appear that the

balance of interest arising from the transactions of the year or other period agreed on should be added or deducted only at the end of such period. If the balance of interest is against the debtor, it then becomes part of the sum on which the next year's interest is calculated, unless paid by him, when he would lose the use of his money while the creditor gained it. In either case he pays *compound interest*.

Now the majority of accounts are made up once a year with a view to a settlement, or for reasons quite independent of the interest: so that many who are accustomed to make them up quite overlook the effect this has on the interest, if they ever think about it at all. When such a person is instructed to make up an account such as that described by the Professor, he would naturally proceed in the way he was accustomed to, quite overlooking the necessary balance at the end of each period at which interest *fell due*, balancing only at the end of the account, and thus charging merely simple interest; and the difference between this method and compounding interest yearly for a term of years could not fail to produce a startling result.

If the payments had been made regularly, the Professor's method of accounting was strictly correct; but if, as he states, they were irregular, it follows from what has been said that he should have balanced at the end of each year, not at the date of each irregular payment.

I think it was the first of these errors, that of charging simple interest only, that the debtor fell into when accounting with his friend and creditor; and afterwards, from not properly understanding Professor De Morgan's method, he applied it to an account on which there were several operations in a year, compounding interest at the date of each operation; or else, falling into the second error, he did not balance at the proper time, which may account for the solicitor requesting him to adhere to his original plan.

There appears to be a misprint in the debtor's reply to the Professor's question, as it is evident that whatever method gave him as a debtor *less* to pay would confer a similar benefit on any other debtor.

There are, I understand, certain accounts, as that between an agent who acts as a *quasi* banker and his client, which must be rendered before interest can be legally compounded. It is held that, until the account is rendered, the client is ignorant of its state, and is deprived of the power of paying the balance should it be against him; while, on the other hand, if the account is rendered and he does not pay the balance, which includes interest, it is held that he consents to the compounding. These considerations can have no weight in such a case as that described by the Professor, but it is just possible that the solicitor who objected to the compounding of interest was influenced by the practice arising from them, such practice being to allow simple interest only to the date at which the account is rendered.

I fear I have already trespassed on your space, but enclose a few practical illustrations of the subject, which you can insert if you think proper.

I am, Sir,

Your most obedient servant,

Edinburgh, Nov. 15th, 1862.

A. H. T.

#### ILLUSTRATIONS.

1. *Simple Interest*.—A borrows £100 for 5 years, to be repaid at the end of that period, with interest at the rate of 5 per cent. per annum.

At the end of the 5 years he pays the principal, with £25 of interest; in all, £125.

2. *Compound Interest*.—B borrows £100 for 5 years, agreeing to pay interest *yearly*, at £5 per cent. per annum.

The interest which B pays is nominally the same as that paid by A (No. 1), viz., £25, but it is paid yearly, by which arrangement B loses the interest on the

1st year's interest for 4 years=	.	.	.	.	£1 0 0
2nd " for 3 "	=	.	.	.	0 15 0
3rd " for 2 "	=	.	.	.	0 10 0
4th " for 1 "	=	.	.	.	0 5 0
					In all, £2 10 0

And his payments are equal to £127. 10s., viz.,—

Principal . . . . .	.	.	.	.	£100 0 0
Interest, £25 and £2. 10s. . . . .	.	.	.	.	27 10 0
					£127 10 0

3. If, instead of repaying the principal in one sum at the end of the 5 years, the debtor pays £50 at the end of the second year, £25 at the end of the third year, and the remaining £25 at the end of the fifth year.

1st. If *simple* interest were payable the account would be stated thus:—

1855. Jan. 1.	To sum lent . . . . .	.	.	.	£100 0 0
1857. "	To interest on £100—2 years, £10 0 0	.	.	.	50 0 0
" "	By cash then received . . . . .	.	.	.	50 0 0
Balance . . . . .					£50 0 0
1858. "	To interest on £50—1 year, £2 10 0	.	.	.	25 0 0
" "	By cash then received . . . . .	.	.	.	25 0 0
Balance . . . . .					£25 0 0
1860. "	To interest on £25—2 years, £2 10 0	.	.	.	15 0 0
	Add interest . . . . .	.	.	.	15 0 0
Balance, principal and interest . . . . .					£40 0 0
" "	By cash then received . . . . .	.	.	.	40 0 0

The debtor thus pays—

Principal . . . . .	.	.	.	.	£100 0 0
And interest, 5 years, on £100 . . . . .	.	.	.	.	£25 0 0
Less on £50 for 3 years . . . . .	.	.	.	.	£7 10 0
" on £25 for 2 years . . . . .	.	.	.	.	2 10 0
					10 0 0
					15 0 0
					£115 0 0

2nd. If the interest were *compounded annually* the account would be as follows:—

1855.	Jan. 1.	To sum lent . . . . .	£100	0	0
1856.	"	To interest for 1 year . . . . .	5	0	0
			<u>£105</u>	<u>0</u>	<u>0</u>
1857.	"	To interest, 1 year, on £105 . . . . .	5	5	0
	"	By cash then received . . . . .	50	0	0
		Balance . . . . .	£60	5	0
1858.	"	To interest, 1 year, on £60. 5s. . . . .	3	0	3
	"	By cash then received . . . . .	25	0	0
		Balance . . . . .	£38	5	3
1859.	"	To interest, 1 year, on £38. 5s. 3d. . . . .	1	18	3
			£40	3	6
1860.	"	To interest, 1 year, on £40. 3s. 6d. . . . .	2	0	2
	"	By cash then received . . . . .	42	3	8
			<u>£42</u>	<u>3</u>	<u>8</u>
		The debtor thus pays £50, £25, and £42. 3s. 8d.=	£117	3	8
		Of which principal . . . . .	100	0	0
		The balance being interest . . . . .	£17	3	8
		Consisting of simple interest . £15 0 0			
		Interest on interest . . . . .	2	3	8
			<u>17</u>	<u>3</u>	<u>8</u>

In the above example interest is accumulated each year, but not paid. If it were paid each year the result would be the same—the debtor would lose £2. 3s. 8d. of interest on the interest so paid.