PREPARATION OF COLOURED MAPS

VOORBEREIDINGEN VAN KLEURENKAARTEN

by/*door*

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For the first maps, that had to be printed in colours, we prepared hand-coloured models and then decided by trial and error how the same colours could be reproduced in printing. This took up much time, so we decided to reverse the procedure and to choose the colours for the maps from a printed colour scale. Our first scale contained 256 colour squares, obtained by printing yellow, red, blue and grey on top of each other, each in three steps: a light screen, a heavy screen and the solid colour. Although the hues of the primary colours were gradually altered to obtain more pleasant results, the content of grey in 3/4 of all combinations caused a more or less dull aspect. The tendency to avoid the use of grey as much as possible limited our freedom of choice to 64 combinations. We therefore decided to leave out the grey altogether and to compensate for the loss of combinations by raising the number of steps for the primary colours.

For the hues of the three primary colours and for the colour-notation we followed the arithmetically spaced system of Hickethier (1952) which has 9 steps from white to full colour. The composition of each colour is indicated by three digits in the sequence yellow, red and blue; 000 means white, 999 means full saturation (chroma) of yellow, red and blue, which should, and in the colour book of Hickethier actually does, show as black. For our purpose we limited the saturation (chroma) of the solid colour to match the 6th step of the scale of Hickethier, leaving us with $7 \cdot 7 \cdot 7 = 343$ combinations. Of these 196 are shown on our sampling sheet, the uneven steps in yellow have been left out to save space, but are of course available for use.

Before printing, the line-screen percentages were measured by microscope and compared with reflectance measurements of printed proofs (fig. 1). The

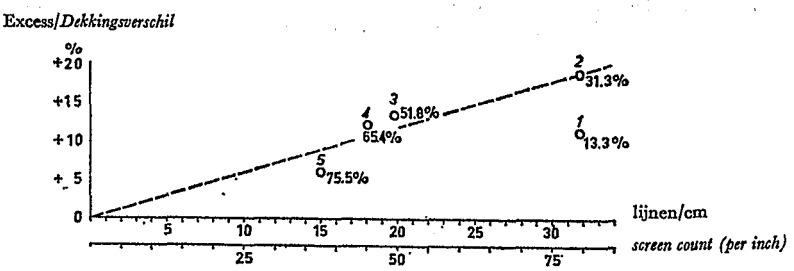

Fig. 1.
Differences in screen percentages between film screens and a printed proof at various screen counts. The percentages on the proof are higher than those of the screens proper. Screen nr. 1 stays behind because the lines are much thinner and consequently do not carry enough ink to spread out as much as the lines of screen nr. 2. Written in: numbers and percentages of screens.

Verband tussen het aantal lijnen per cm en de afwijkingen in dekkingspercentages tussen een proefdruk en de daarvoor gebruikte filmrasters (door de getallen aangegeven). De dekking op de proefdruk is hoger dan die van de rasters. Raster 1 blijft achter, omdat de lijnen veel dunner zijn en dientengevolge niet voldoende inkt voeren om deze even breed te doen uitvloeien als bij raster 2.

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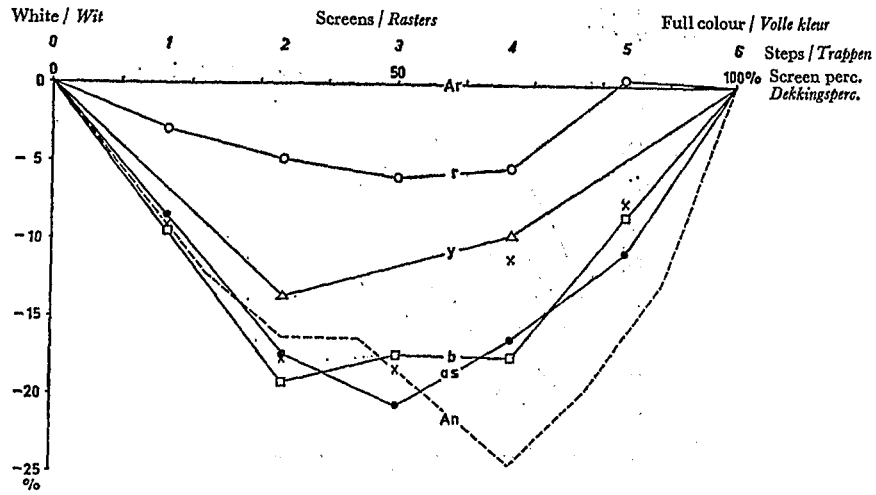

Fig. 2.
Screen percentages of the screens and of the single colour steps of the printed scale, average of three copies taken from the run, plotted out in the same manner as in fig. 3b. From the measurements on the printed proof (fig. 1) screen percentages (×) for the stripping film have been computed, that should have brought the printed steps, arithmetically spaced, onto line Ar. Actually the screens 3, 4 and 5 have been processed 2½ to 5% too low (as). In addition the printed steps are lower and show different curves for yellow (y), red (r) and blue (b), although they have been copied from the same screens. For comparison: steps of the analytical scale (An) of A.C.I.C.

Verloop van de dekking van de rasters en van in eerste oplage gedrukte kleuren. De dekkingspercentages zijn uitgezet, zoals in fig. 3b. Uit de afwijkingen bij de proefdruk (fig. 1) werden voor de rasters de dekkingen (×) *berekend, die bij de druk punten op de rechte lijn* (Ar) *hadden moeten opleveren. De vervaardigde rasters (3, 4 en 5) op stripping film weken daarvan ten dele af* (As). *De druk viel „schraler" uit en verschillend voor de kleuren geel* (y), *rood* (r) *en blauw* (b). *Ter vergelijking de analytische reeks* (An) *van A.C.I.C. (Aeronautical Chart and Information Centre).*

line-screen percentages were then adjusted so, as to result in an arithmetically spaced scale when printed. Measurements on the completed sampling sheet however showed a considerable deviation from the values aimed at, as well as big differences between the colours yellow, red and blue, although they had been processed with the same stripping film (fig. 2). Such deviations in screen percentages, occurring during copying and printing should be brought under control to a certain degree, before attempts to obtain closer or more perfect colour spacing can succeed.

Although it is generally agreed, that arithmetical spacing is not perceived as such by the eye, there seems to be difference of opinion on the way it should be improved upon. The run of the curves of Ostwald and Munsell is quite the opposite of the newest trend represented by the analytical scale of A.C.I.C. (figs. 3a and 3b). Perhaps a compromise, as indicated by the S-shaped curve can be applied until agreement has been reached and a feasible scale has been developed and broken down into screen percentages ready for use by lithographers and printers.

The lithographic work, formerly executed at various printers offices, at present is done at our institute. The screens, are copied on sheets of stripping film. A wax mixture (Flexo Wax light C mixed with paraffin wax) is applied

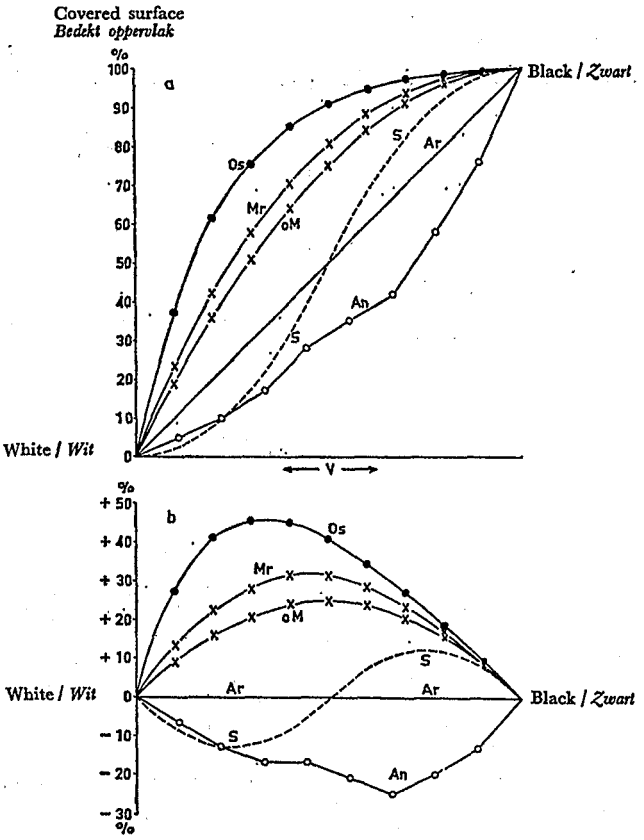

Fig. 3a.
Percentages of covered surfaces of a number of grey scales. Os = Ostwald, oM = original Munsell, Mr = Munsell renotation, An = analytical scale of A.C.I.C., Ar = arithmetical scale (such as Hickethier), SS = S-shaped curve, V = division into a number of steps.
Verloop van de dekkingspercentages bij enige grijsschalen. Os = *Ostwald,* oM = *originele Munsell,* Mr = *Munsell renotation,* An = *analytische schaal (A.C.I.C.),* Ar = *rekenkundige schaal (o.a. Hickethier),* SS = *S-vormig verloop,* V = *indeling in een aantal trappen.*

Fig. 3b.
Same data as in fig. 3a. plotted out as deviations from arithmetical spacing.
Dezelfde gegevens als in fig. 3a, echter uitgezet als verschil t.o.v. het rechtlijnige verloop Ar.

to the stripping film with a brush, the working area is kept warm by a radiator with reflector. The waxed stripping film is then stuck onto the transparencies and the superfluous parts are cut away along the soil boundaries on the guide; to make this possible the stripping film for solid colour and the heavy grids is not developed in black but dyed red instead.

If necessary the three basic colour printers are supplemented by patterns and hatchings printed in strongly saturated colours or in black.

From the printed colour scale a scheme has been worked out enabling us to mix any desired colour from three standard solutions of water colour and water, resulting in a much closer resemblance between coloured models and printed products and in a very considerable saving of time. The same method is also applied for the numerous maps coloured by hand, which con-

stitute the bulk of our map production. Of those we prepared a first edition of 5 or 6 copies for urgent needs. A second edition was coloured later on. We still do this with simple maps, that can be copied quickly, otherwise we prepare only one map by hand and multiply by colour photography. The maps have than to be divided into sheets of 20 by 24 inches. There is still a considerable difference in colour between the original and the copies but the resulting coloured maps amply satisfy the purpose they have been made for.

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SAMENVATTING

Het grootste deel van de kaarten (schaal 1 : 10.000) die door de Stichting voor Bodemkartering worden afgeleverd, wordt vermeerderd met behulp van lichtdruk. Sinds kort is het aantal kaarten, dat met de hand werd ingekleurd, teruggebracht van 6–12 op 1. Vermeerdering geschiedt thans met behulp van kleurenfotografie. Jaarlijks worden voorts enkele kaarten in kleuren gedrukt op schaal 1 : 25.000. Deze kleuren worden gekozen uit een driedimensionale kleurenschaal met 6 trappen van elke primaire kleur. Met behulp van lijnrasters van toenemende grofheid worden de kleuren onderscheiden. De verzadiging (chroma) van de volle kleur in de zesde trap wordt op 2/3 van het bereikbare maximum gehouden. De kleurenschaal werd opgezet als een uittreksel van de rekenkundig verdeelde schaal van Hickethier. Deze heeft haar volledige verzadiging bij de negende trap. Reflectiemetingen toonden aan, dat de rekenkundige verdeling niet bereikt werd. Dit ten gevolge van afwijkingen in de rasterpercentages, die optreden bij kopiëren en drukken. Deze afwijkingen moet men voldoende in de hand krijgen, aangezien anders pogingen tot verbetering van de kleurverdeling weinig zin hebben. De verbeteringen t.o.v. de rekenkundige verdeling, zoals die werden voorgesteld door Ostwald en Munsell, schijnen voorts lijnrecht te staan tegenover de laatste opvattingen, zoals die worden gedemonstreerd in de analytische schaal van A.C.I.C.. Het zou goed zijn wanneer kleurendeskundigen hieromtrent zouden trachten tot overeenstemming te komen.

Uitgaand van een min of meer ideale schaal zou deze moeten worden teruggebracht tot een aantal hanteerbare benaderingen in termen van rasterpercentages voor driekleurendruk ten behoeve van lithografen en drukkers.

Een mengschema werd samengesteld om in staat te zijn de kleuren van de gedrukte schaal te reproduceren. Hierbij worden bepaalde hoeveelheden van drie standaardoplossingen ecoline gemengd. Sindsdien worden de kleuren voor alle kaarten, die met de hand worden ingekleurd, gekozen uit de gedrukte schaal, terwijl de tijd, nodig voor de menging, aanzienlijk kon worden bekort. Daarenboven werd de gelijkenis van de gedrukte kaarten met de gekleurde modellen aanzienlijk verbeterd.

LITERATURE

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